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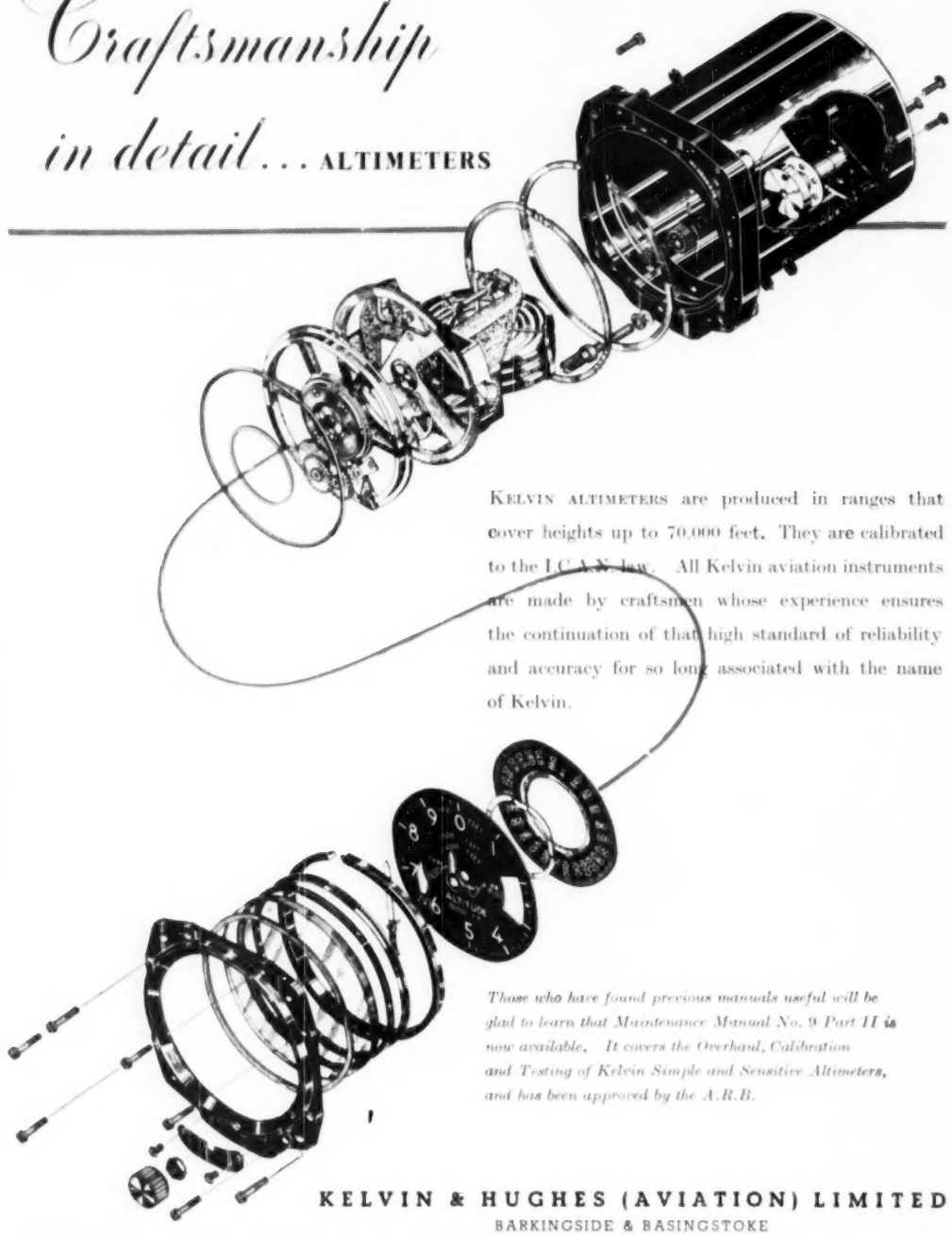

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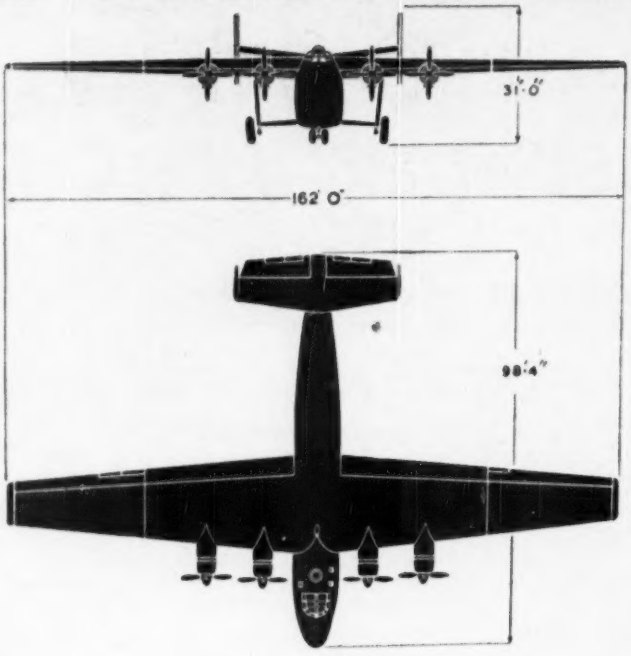

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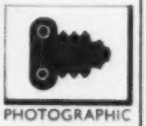
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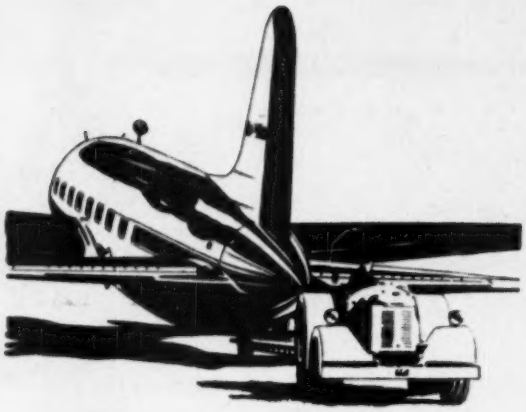

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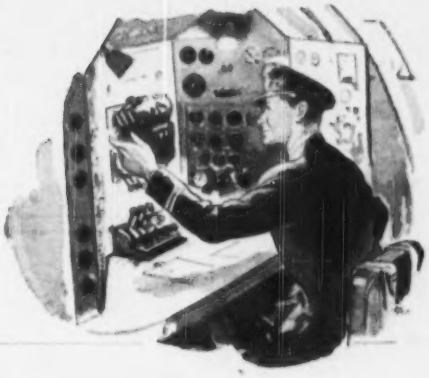

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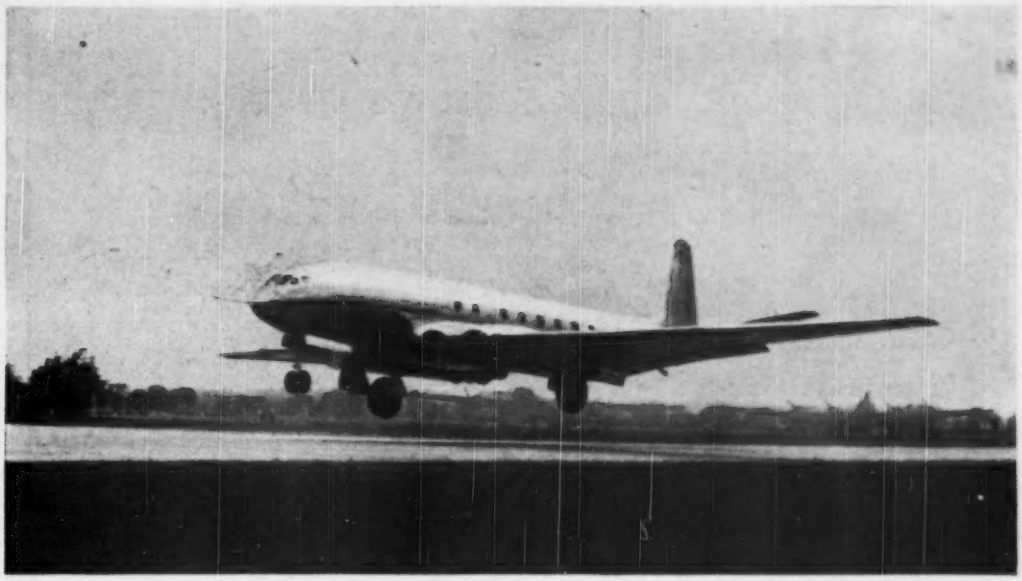

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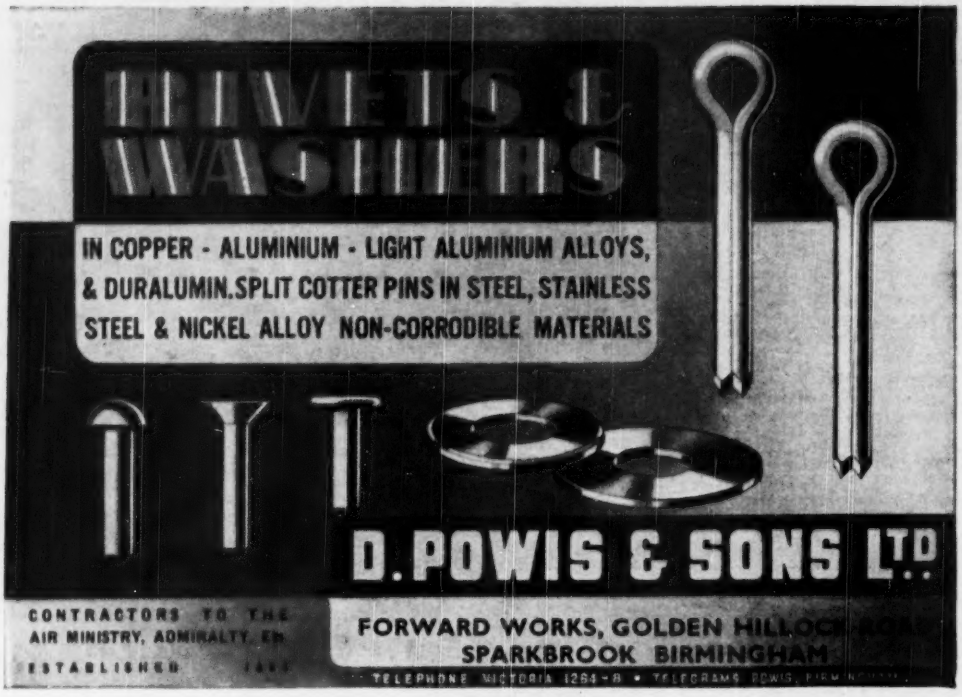
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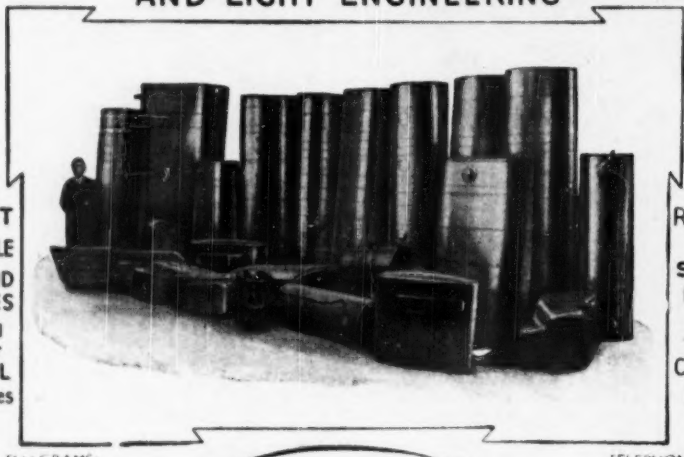

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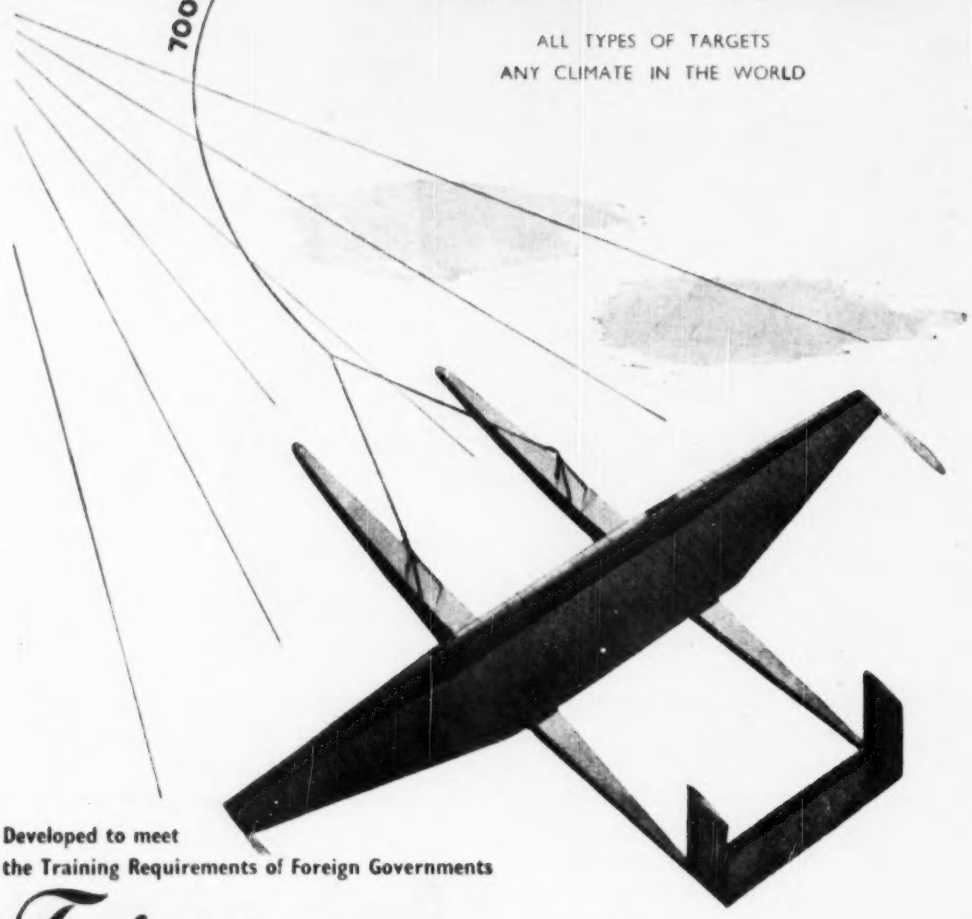

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Husbandry

LAST autumn Lord Tedder stated that a position had been reached where no single democratic country, even including the United States, can or will pay for forces which by themselves will suffice to gain the time needed to prepare an adequate defence. His statement brought home forcefully what most people realized to be one of the chief underlying reasons for collective security in the Atlantic Pact and Western Union. For generations the British race felt secure in the might of the Royal Navy and believed in the country's ability to defend itself unaided, but now the whole picture has been changed by the development of military aircraft and the long-range missile. The blunt statement of the then Chief of the Air Staff came as something of a shock to many, for tradition dies hard. The singleness of purpose which made possible in war the vast united effort of the many nations who fought as allies to subdue Germany has lost something of its potency in this uneasy period of peace. But more slowly, perhaps, though no less sincerely than the smaller nations, the British people as a whole are beginning to accept the ideal of one integrated international defence force for Western Europe.

Particularly appropriate is the choice, as announced last week, of an air examining squadron, to be the first completely integrated international defence unit within the structure of Western Union (see page 509). Its aim—to standardize the flying training of Western Union air forces and to improve the level of efficiency—is calculated to ensure from the start a common outlook towards instruction and flying methods. It should provide a firm basis for co-operation among the aircrews of several nations who may, almost without warning, be called upon to operate as one unit. Already many of the defensive squadrons of Western Union and neighbouring friendly countries fly aircraft equipment common to all—namely, British (though sometimes Continental-built) Vampires or Meteors.

The need to think and act internationally is by no means limited to the military sphere of aviation and, in fact, the organization and control of commercial flying all over the world daily becomes more of a combined responsibility for all countries, and thus sets an example for the co-operation of air forces. In Britain there is also great benefit to be derived from a more complete integration of the military and civil branches of aviation.

In uniting with other nations for mutual defence, this country does not hand on some of her responsibilities; on the contrary, she undertakes new obligations, particularly in regard to her air strength. *Flight* has viewed with alarm, and on occasions criticized constructively, the material deficiencies apparent in the Royal Air Force. Concern has also been voiced at the continued loss to other industries of skilled aircrews, ground crews and operatives in the aircraft factories. We have sought signs that an effort is being made to husband every resource still available, and happily there are indications, small but heartening, that something is at last being done, or at least that those in a position to act are now anxious to do so.

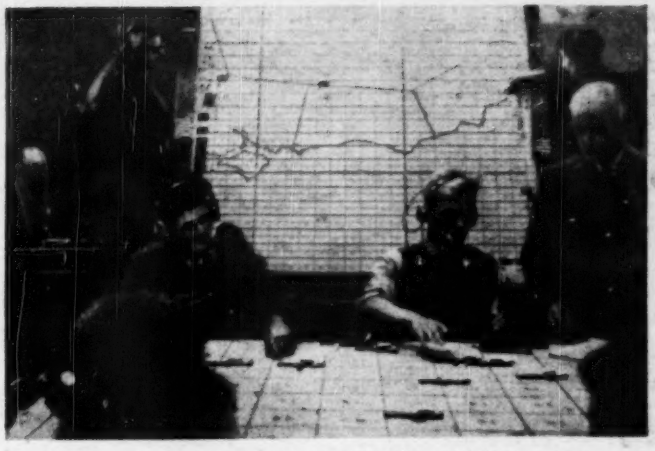
In February came the good news that flying training would be given at approved civil flying clubs to selected A.T.C. cadets, a sum of £30,000 for the year having been made available. This, together with current R.A.F.V.R. and University Squadron contracts, will help to keep together the existing club teams—ground crews and flying-control staffs—in addition to the primary purpose of producing a reserve of pilots and crews.

The chairman of a sizeable independent operating company proposed, in a recent speech, that concerns such as the one he represented be included in the country's defence plans as auxiliary transport units ready in emergency for immediate operation as a mercantile air fleet. There is reason to believe that the Air Staff is thinking along the same lines regarding both the Corporations and the charter companies.

Finally—and here, perhaps, is the greatest bottleneck in the way of real preparedness—the R.A.F. must do everything possible to make up for its shortage of skilled tradesmen. One way of tackling the aircraft servicing problem would be to subcontract more of the work to civilian firms possessing the necessary facilities.

TWENTY-FIVE WATCHFUL YEARS

R.O.C. Celebrates its Silver Jubilee : The King Becomes Air Commodore-in-Chief



A view of the main table of an R.O.C. Centre and the long-range board on which are recorded aircraft movements over a wide area and of all aircraft about to enter the group.

WITH the attainment this week of its silver jubilee, the Royal Observer Corps has been honoured by the consent of His Majesty the King to become its Air Commodore-in-Chief. This milestone in the history of the Corps is also being marked by the award of the R.O.C. Medal to all members with a record of 12 or more years of satisfactory service.

It is nearly nine years since, in 1941, the Observer Corps was given the prefix "Royal" in recognition of the valuable service which it performed during the Battle of Britain and the subsequent "Blitz" period; at that time its strength was 32,000—28,000 men and 4,000 women, manning 1,400 posts and their control centres.

Apart from its primary duty of spotting aircraft and identifying those of the enemy, the R.O.C. performed a number of other valuable services of a nature not so widely known. On more than 500 occasions, for example, observers were specially detailed for work defined by the code-name *Granite*—the lighting of flares to assist friendly aircraft to avoid hills and obstructions, and the use of *Darky* R/T. Again, more than 1,000 observers went to sea with the Allied invasion forces.

A uniformed civilian organization, the R.O.C. practises at week-ends and holds an annual camp at an R.A.F. station. This year's camp will be at Waterbeach, Cambs, from June 26th to July 29th.

During the present Jubilee Week group meetings are being held at operational centres, a number of which will also be open to the public. In the South, an exercise is to be held, centred on the original post established at Cranbrook, Kent, 25 years ago. This post will be fully manned under Chief Observer S. E. O. Crouchman, who has been in command since 1926.

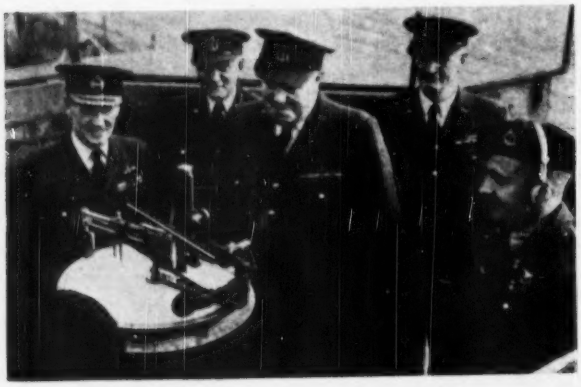
In the following notes a member reviews the present situation of the R.O.C., with emphasis on questions of recruiting and equipment.

The R.O.C. To-day

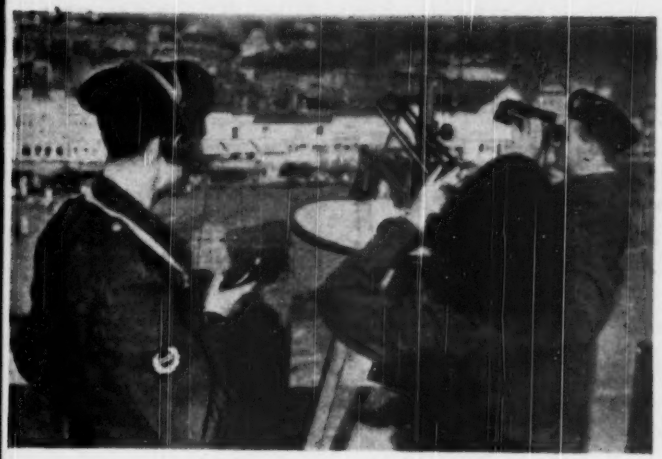
When it was reformed in 1947 after nearly two years' stand-down, the Corps was in much the same position as the R.A.F. as a whole, i.e., groping in the dark over the future of air defence. Like its parent body, the peace-time observer system has been reorganized on a realistic basis, taking into account foreseeable developments and limitations and discounting the theory of push-button warfare in the immediate future.

Its real purpose is to provide the complete picture of air activity over the British Isles by visual and aural means. It was suggested at one time that posts were to be equipped with radar, but apart from causing administrative and operational chaos such a scheme would have defeated its own object. Radar is by no means perfect: the R.O.C. is the link where radar leaves off, and it provides a supplementary source whereby radar and human plots can be "married" to form the most comprehensive warning layout. Were all posts to be radar-equipped and the enemy find a sure means of jamming, this country would be completely blind. Some form of mechanical aid may well be introduced later, but it is a thing of tomorrow, not of today.

Certain difficulties were encountered early on in the reorganization, and these can be summarized as follows: Rebuilding of groups and posts; communications; recruiting; and training and operations. Centres and posts had been unused for nearly two years and many had been dismantled, whilst derequisitioning of property had forced units out into the open with only terminals on a telegraph pole to



Commandant of the Royal Observer Corps., Air Commodore R. B. Jordan, C.B., D.F.C., A.D.C., (left) inspecting a post in No. 5 (Coventry) Group during an exercise.



A coastal observer post in operation on a local disused church tower during a mock attack. The woman observer is plotting the course and height of an aircraft, whilst a leading observer on the left reports to centre.

indicate their existence and means of communication.

Each group had its own particular worry, and shortage of group officers and of head and leading observers was acute. This was due to members going over the age limits, resigning, or moving away from the locality; it is always difficult to find those who will take on work of an administrative and training character in the national interest in their spare time.

Closely linked with group rebuilding was the resetting of the communications network. The Corps, with 1,400 posts and 40 centres, required a very intricate telephone system, which in many cases had been removed after the war. The already overburdened G.P.O. had to lay new lines, relay old ones, and fit the whole layout into the normal civilian pattern.

Traffic Breeds Enthusiasm

Much good progress has been made in both groups and communications, but more obstacles have been found in the North than in the South. In the South the standard of air-mindedness has always been high for many reasons, not least of which are the front-line nature of the area and the intense air activity over it. In isolated areas interest is difficult to maintain, due to lack of all-round activity.

A major factor has been the gradual weeding out of the apathetic and the building up of a solid foundation of enthusiastic and reliable part-time officers and N.C.Os. With centres settled and telephone lines in, deputy group commandants (full-time officers) have been able to get on with raising the standard of efficiency of their post and centre crews.

The R.O.C. is affected in recruiting by the great area covered and fluctuating densities of population—for instance, in the Scottish Highlands a post will be most difficult to man, while that in a large town may be full. In addition, posts are sited for maximum visibility and to fit in with the pattern, and not for closeness to town or village.

In 1947 it was not known what the response from the public would be, and the position of "Z" class reservists was very far from clear.

In three years recruiting has not been speedy, but it has been steady, and headquarters may feel some satisfaction that they have achieved well over half their target of 28,000. Reservists from all the Services may now join and there has been a great influx of war-seasoned personnel, particularly from the R.A.F. One of the main causes for worry is lack of plotters, especially girls, at centres.

All training is spare time and the tests have been arranged in a similar manner to those of the war years. At first the main object was to bring all members, old and new, up to a basic standard of plotting and recognition, and then encourage them to take the intermediate and master tests, which are voluntary.

The intermediate remains much the same as in wartime, but the master test has been considerably improved by the introduction of two separate written exams. for posts and centres, in addition to the film—from the recognition angle anyone who passes the master test may truly claim to be an expert.

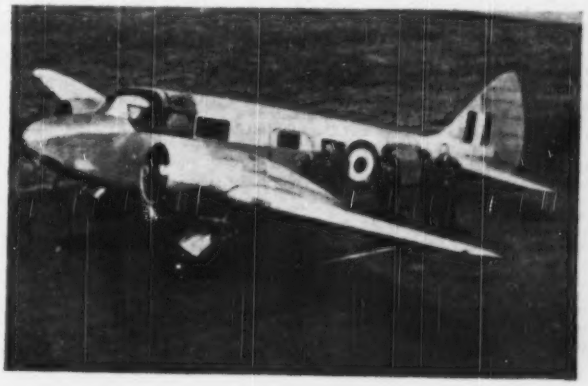
As for recognition, it is realized that while there are aircraft flying that can be seen, they must be known. One thorn in the post instructor's side is that the proficiency-test cards go quickly out of date and replacements are not forthcoming—as a result, he is forced to teach his crew things like the Merganser and the M.68 when he knows that no one will see them and that new production aircraft are left out. Some more flexible system whereby tests may be revised every six or twelve months would appear to be called for.

The principles of procedure can be taught, but the periodic exercises provide much-needed practical experience, and they have brought to light one grave deficiency in our defensive chain as shown in the Press reports of exercises *Bulldog* and *Foil*—namely, low-level, high-speed intruders. The R.O.C. is the only arm which can give accurate warning of such raiders, as C.H.L. is most unreliable under these conditions.

R.O.C. posts have had to speed up plotting and reporting and although they have the same instrument as in pre-war days, aircraft speeds have risen from 360 m.p.h. in 1940 to 550-600 m.p.h. in 1950. There must be no delay in getting information through, and research is being carried on in this field and with G.C.I. to cut out time-lags.

* * *

As part of the R.O.C. Week celebrations, a number of operations centres in the Southern Area are holding "open days" for the public. On Saturday, April 22nd, the No. 4 Group centre at the Drill Hall, North Way, Oxford, will be open to the public all day, and No. 19 Group, Dura Den, Beckenham Park Place, Beckenham, Kent, will welcome its visitors between 7.30 p.m. and 10 p.m. During the afternoon and evening of to-day, April 20th, No. 2 Group and 18 Group centres at the Drill Hall, Denne Road, Horsham, Sussex, and Lexden Road, Colchester, Essex, will also be "at home" to the public.



R.O.C. personnel are given experience flights at various R.A.F. stations, and particularly during the annual summer camp. Pilots detailed for this work are often surprised to find numbers of ex-R.A.F. aircrew on board.

LESSONS of "PLAINFARE"

A. Cdre Merer's R.Ae.S. Lecture on the Berlin Air Lift

A PAPER entitled *The Berlin Air Lift* was read before the Royal Aeronautical Society on April 13th, by A. Cdre. J. W. F. Merer, C.B., who, during the period of the Lift, was A.O.C. No. 46 (Transport) Group, B.A.F.O., and Deputy Commander of the Anglo-American Combined Air Lift Task Force. For his services he was appointed a C.B. in the 1949 Birthday Honours. A. Cdre. Merer, who began to specialize in navigation early in his career, is at present Director of Navigation and Control at the Air Ministry.

The original lecture sets out in detail the origin and evolution of the Air Lift and the organization and utilization of the forces employed in it. Below we present a digest of A. Cdre. Merer's comments on the operational problems set up by the largest air-transport task ever undertaken. Although formed from a military standpoint, his views on such important questions as high-density traffic-control will be read with interest by Service and civil authorities alike.

Outlining plans made early in 1949 for establishing the Air Lift on a long-term basis, A. Cdre. Merer revealed that provision was made for re-equipping Dakota squadrons with Hastings. In addition, work began on extending the six existing airfields in the British zone to enable them to operate up to 60 four-engined aircraft each and to prepare a seventh to the same standard. Construction of a third runway at Gatow was also begun. By July, however, the re-opening of surface communications between Berlin and the Western zones permitted the beginning of a progressive scaling-down of the British effort.

The diversity of types of British aircraft employed added to the R.A.F.'s difficulties. In effect, the U.S.A.F. operated only one type, the Skymaster, and carried mainly standard loads of coal; consequently their utilization rate was considerably higher. Experience gained with operation of the Freighter and Wayfarer had greatly emphasized the advantage of end-door unloading for intensive freight-carrying operations; loading was easier, and the aircraft required a smaller area of hard standing. The use of side-doors required additional space to enable the load-delivering vehicles to approach the aircraft, and the risk of damage, particularly at night, was increased. For ease of loading, the author concluded, an aircraft's doors should be as large as possible, and its floor should be horizontal in the loading attitude.

Corridor-despatch Systems

It was recalled that, by Four-Power agreement, air traffic between Berlin and the Western zones was confined within three corridors, each 20 miles wide, and extending from ground level to 10,000ft. The three points of entry to the Western zones, and their respective distances from Berlin, were Hamburg (93 miles), Hanover (117 miles), and Frankfurt (216 miles). No radio or radar navigational aids were available within Russian-occupied territory.

When it became necessary for American and British aircraft to use a common corridor, differences in navigational technique necessitated modification of the original system of "continuous despatch." The R.A.F. aircraft carried a navigator and were equipped to use Gee and M.F. beacons, whereas the Skymasters carried no navigator and relied on radio ranges, M.F. beacons and visual-aural ranges. To maintain a continuous flow, therefore, a "time-block" despatch system was devised by which each base was allocated blocks of time over Fröhnau. As the C-54 was the heaviest load-carrier, the block was fixed at four hours—the time taken for a complete C-54 sortie, including unloading in Berlin, loading and refuelling at base—to ensure maximum utilization. However, difficulties arose in servicing, loading and turning round the British aircraft with their varying performances and loads; a two-hour block was therefore substituted and finally an hourly despatch system was adopted.

The lesson to be derived, said A. Cdre. Merer, was that if circumstances prevented the adoption of continuous despatch—the most efficient system—and the "time-block" system was employed as an alternative, the frequency of the block cycle and the number of aircraft in each block required very careful consideration.

Experience gained with G.C.A. landings emphasized the necessity for two parallel runways, one for take-off and one for landing, at the terminal airfields. A third runway was, in fact, required to allow for the repair and maintenance of one runway.

Traffic control in the Berlin area had presented a complex situation which ruled out any form of holding or stacking as dangerous and unacceptable. A traffic system was therefore developed by which aircraft checked over the beacons at the Berlin end of the northern and southern corridors, and let-down on a timed approach pattern. Air-speed, rate of descent and the height over certain points of the pattern were laid down in the standard flight procedures. Where necessitated by the proximity of two traffic streams, turning-points in the pattern were marked by radio and radar beacons—as, for example, the point at which Gatow traffic turn from base-leg to finals for landing in an east-west direction. G.C.A. was employed for approach and let-down in instrument flight conditions, but B.A.B.S. was also installed at both Gatow and Tegel for use by the British aircraft.

Gatow traffic-pattern

The routine for Gatow traffic was that each aircraft called approach control—manned by a team of three watch-keeping officers, an approach controller, an airfield controller and a supervisor—20 miles short of Fröhnau beacon, and was instructed to adjust its height to 3,500ft over the beacon. It was then given a runway touch-down time and checked through the various stages in the traffic pattern to the point where it was handed over to the airfield controller or, in instrument flight conditions, to the G.C.A. final controller. Aircraft unable to land at their first attempt were not allowed to re-enter the approach pattern, but were required to over-fly the airfield and return to base, except in emergency. One of the major difficulties experienced was the inadequate number of R.T. frequencies in the aircraft. The Berlin approach procedure had necessitated 12 separate frequencies. Some aircraft carried eight frequencies, and the remainder four; a compromise had, therefore, to be adopted in which one frequency could be used for two functions.

The pressure of work on air traffic control staffs created its own problems, and responsibility for marshalling of aircraft and the control of M.T. in the loading areas was, at Gatow, delegated to "tarmac officers." Under their supervision, teams of marshallers, or, alternatively, "lead-in" vehicles, conducted the aircraft to and from their allotted apron position.

Discussing the effects of weather, A. Cdre. Merer mentioned that little interference was experienced from snow and ice on the runways, and the measures prepared for dealing with these problems could not be seriously tested. There was, however, severe interference from fog, although flying was continued down to weather minima of 800 yards horizontal visibility and 200ft cloud ceiling. The British aircraft, with their conventional tail-wheel undercarriages, were severely handicapped by cross-winds, particularly as the runways at Gatow, Tegel, Fühlsbuttel and Lubeck were sited in one direction only. The C-54s, with their nosewheel undercarriages, showed a big advantage, not only for cross-wind operation but also in their increased manœuvrability on the ground, and for added directional control on take-off and landing.

Size and Economy

One of the most striking object lessons of the Air Lift was the advantage of economy in operation of the heavy load carriers. The C-54 or the Hastings presented no greater problem than the Dakota in operating along the corridors into Berlin or in loading and unloading, but the load delivered by the Dakotas was approximately one-third that of the others. This disproportion in the load carried was not reflected in the "overheads" in aircrew or servicing personnel, as shown in the following figures for a task of delivering 4,500 tons per day to Berlin for 30 days.

	No. of Trips	*Crews*	*Aircraft*	*Maintenance Personnel*	*Fuel Used (Gallons)*
C-54	13,800	465	178	4,674	8,577,600
Dakota	39,706	1,765	889	10,588	14,294,000

These figures, supplied by the U.S.A.F. on experience gained on the Frankfurt corridor, were based on the assumption that payloads of the Dakota and C-54 were, respectively, 3·4 and 9·7 tons, and the maximum flying hours for the crew were 60 per month. At the peak period of the Lift, the British

aircraft were flying one-third of the total service although they carried only a quarter of the combined total tonnage. This discrepancy was due almost entirely to their lighter load capacity, in most cases, compared with that of the C-54. It emphasized sharply the necessity for the employment, on an operation of this nature, of the heaviest possible load carriers, consistent with such operational factors as runway-strength.

Some months before the end of full-scale operations, on July 31st, 1949, the Air Lift had settled down to a steady routine which could have been continued indefinitely with the existing organization and resources. Within certain limits, the daily tonnage could have been increased by refinements in the organization and additional resources which had been planned. A significant improvement in performance followed the progressive standardization of techniques and procedures of the combined British and American force. Conversely, a diversity in types and equipment of aircraft, inevitable in the circumstances, intensified a number of the problems.

NEW FAN FOR FARNBOROUGH

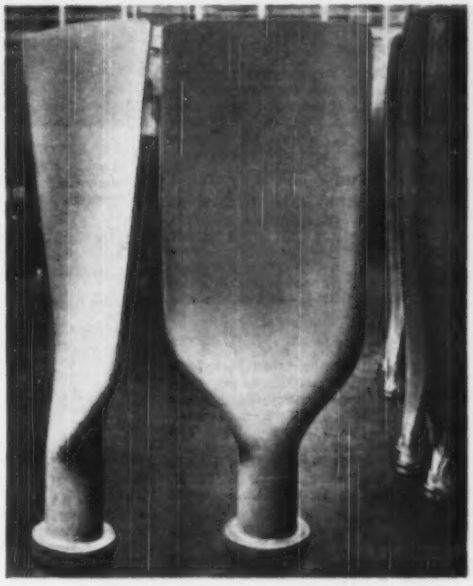
Unchanged Performance with Fatigue Reduction

THE accompanying photograph shows stages in the production of new blades for the fan of the high-speed wind tunnel at the Royal Aircraft Establishment, Farnborough.

Two years ago—March 4th, 1948—the details of the high-speed tunnel were published in *Flight*, and so far as the normal operating conditions are concerned they remain unchanged. The fan is 15ft 11in in diameter, and comprises thirteen blades on a spinner-type fairing; in airscrew parlance, the unit is a left-hand tractor, and the normal maximum speed of rotation is 850 r.p.m., this giving a flow-speed through the working section equivalent to a Mach number of 0.8, or 600 m.p.h. at sea-level I.C.A.N. conditions. The fan is driven by two D.C. motors which, each of 2,000 h.p., are mounted in tandem.

Whereas the original fan blades were forged in RR 56, the new blades are of Hiduminium RR 58. High Duty Alloys, Ltd., have been responsible for making the primary forgings, the work having been carried out at the Redditch works of the company. In the finished-forged state, the blade units each weigh 1,465 lb. Machining to form is being undertaken by the de Havilland Propeller Co. at Hatfield, and in the fully finished state, the weight of each blade is 370 lb.

We understand from de Havilland's that the aerodynamic design of the fan blade remains unchanged, but that the use of RR 58 in place of the original RR 56 has resulted in some advantage in stress loading.

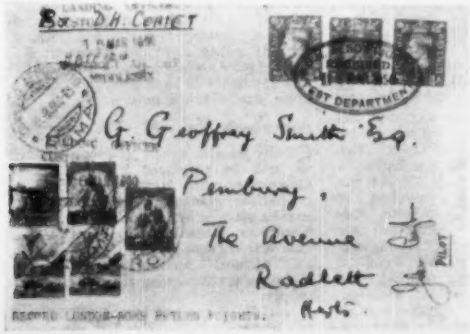


Partly finished blades for Farnborough's new wind-tunnel fan.

JET MAIL TO NEW YORK

ARRANGEMENTS were made for the Avro-Canada Jetliner to carry mail when it flew to New York on April 18th to take part in the aviation exhibition of the Society of Automotive Engineers. This is believed to be the first official mail delivered by a jet transport and, incidentally, it is the Jetliner's first flight outside Canadian territory.

In this connection the accompanying illustration will be of interest. The cover concerned was one of three carried from London to Rome and back on the Comet's recent record-breaking flight, and although on the outward journey it was unofficial air mail, the Italian authorities at Rome readily agreed to the suggestion that Italian stamps should be affixed and correctly franked for the return flight. It will be noted that the British Customs stamp—corrected from Northolt to Hatfield—both inward and outward, bears the same date, and that Mr. John Cunningham, the pilot, has signed the envelope on the right-hand side.



Collector's piece ? A cover carried from Rome in the Comet.

R.A.F. Ex-P.o.W.s' REUNION

AT the Albert Hall last Friday, April 14th, the R.A.F.A. held the first ex-P.o.W.s' cabaret ball and reunion. Some 2,500 guests showed their approval of the idea of holding such a function, and difficult as it always is to find all one's friends in a building as big as the Albert Hall, there is no doubt that everyone had a very enjoyable evening.

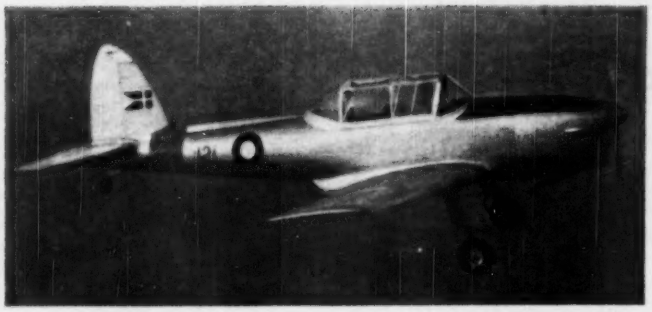
Music was provided by the R.A.F. Central Band's dance orchestra under the leadership of Sgt. H. Fitzhenry and by Jos Loss and his radio orchestra, and the organized programme (the mistake of over-organizing the evening made at certain other such functions was avoided) included an enthralling demonstration, together with commentary by Oliver Philpot, of incidents from the now classic Wooden Horse escape. Members of the Chislehurst Branch of the R.A.F.A., who brought with them a replica of the vaulting horse, were responsible. Entertainment was also provided by the Luton Girls' Choir and Humphrey Lestocq, and raffle prizes (which included a free week-end in Paris for two) were presented by the Swedish actress Signe Hasso.

Among those present were the Chief of the Air Staff and Lady Slessor; the president, Air Marshal Sir Richard Peck; the vice-president, A.V-M. Sir Charles A. H. Longcroft; and, incidentally, Padre Harry Thorpe.

P/O. M. B. LE POER TRENCH

A PROMISING R.A.F. career was cut tragically short on April 16th when P/O. M. B. Le Poer Trench died at sea shortly after rescue. Following a collision, he had baled out of a Vampire. P/O. Le Poer Trench graduated from Cranwell last year as an outstanding member of No. 46 Entry, and winner of the Chance Memorial Prize.

HERE and THERE



FOR EXPORT ALSO: Bearing Danish Air Force markings, this de Havilland Chipmunk is the first of its type to be built in Britain to an overseas order. Toronto-made Chipmunks, however, are serving with the Canadian, Belgium, Siamese and Egyptian air forces, and they are in civil use in six other countries.

Royal Display

VAMPIRES and Lancasters took part in a flying display for Princess Elizabeth at Luqa, Malta, on April 12th. Accompanied by A.V-M. N. H. D'Aeth, A.O.C., Air H.Q., Malta, the Princess made an extensive tour of the station.

Hopes Dashed

MR. AND MRS. BOB BIXBY returned to San Fransisco on April 13th after a gallant, but unsuccessful, attempt to beat the late Bill Odom's round-the-world record of 73hr 5min. Their converted Mosquito was held up twice by engine trouble—at Calcutta and Tokyo.

"Fido" Awards

THE Royal Commission on Awards to Inventors has recommended total payment of £5,000 in settlement of claims concerning "Fido," the war-time development for dispersal of airfield fogs. The Commission advises that £3,000 be shared between Mr. A. C. Hartley, Mr. F. Gill and Mr. D. A. Fox, and that Dr. H. R. Fehling and Dr. P. O. Rosin should share £2,000.

Publication Suspended

AFTER the war, many R.A.F. officers formerly imprisoned in Stalag Luft III and Tarmstedt subscribed towards publication of an account of the marches in which they took part in Germany. Publication of the story has now been indefinitely suspended, and subscribers who wish to have their money refunded should write to Mr. Aidan Crawley, the Under-Secretary of State for Air, at Air Ministry, King Charles Street, London, S.W.1. Money unclaimed within three months will be given to the R.A.F. Benevolent Fund.

In Camera

AIR photographs of a damaged plantation were produced as evidence in a recent Newcastle court case, when four men were fined for stealing trees owned by the High Sheriff of Northumberland. The pictures were taken by an ex-R.A.F. detective.

Another Gliding Record

MR. G. H. STEPHENSON, flying his own Olympia sailplane, has added a third notable British gliding performance to those reported on page 506. On Sunday last, he flew from Redhill to Thruxton and back without an intermediate landing, a distance of 126 miles. The previous out-and-return record (114 miles) for the United Kingdom was set up by Mr. C. J. Wingfield in 1948.

Mr. Stephenson — "Steve" to the British gliding fraternity—made, in 1939, the first glider crossing of the English Channel. On his latest flight, which lasted 4 hr 55 min, he reached a height of 10,300ft on the return journey.

BOMBED SITE? Extensive damage to the Paris-bound B.E.A. Viking *Vigilant*, originally believed to have been caused by lightning, is now thought to have been the result of an explosion. The Viking was "put down" safely at Northolt by Captain Ian Harvey, and the only injuries were sustained by the stewardess. Earlier in the day, *Vigilant* had been refuelled at Geneva; Swiss Federal authorities are now co-operating with Scotland Yard in investigating the theory of sabotage. The Viking's survival is indeed a tribute to sturdy Vickers design and construction.

"Brab." for London

WITHIN a few weeks, it is hoped, the Home Counties will be afforded an opportunity of seeing the Bristol Brabazon at close quarters, when it visits London Airport for landing and take-off trials. The tests will last about a week.

New Aircrew Opportunities

THE Air Ministry's new scheme for training more National Servicemen as aircrew appears to be a step towards filling the current need for gunners and engineers. Under the new scheme, some 400 National Service volunteers will be trained annually in these aircrew categories. After six weeks' recruit training, prospective gunners and engineers will undergo, respectively, four months' and six months' aircrew instruction. Some will complete their 18 months of National Service on operational bomber squadrons.

Baltic Search Abandoned

SHORTLY after the British steamer *Beechland* picked up an empty dinghy in the Baltic last Sunday, the U.S.A.F. announced abandonment of the widespread search for the Convair Privateer Naval patrol aircraft which had been missing since April 8th. The Privateer, which was carrying a crew of 10, was on a training flight from Wiesbaden, Germany, to Copenhagen.

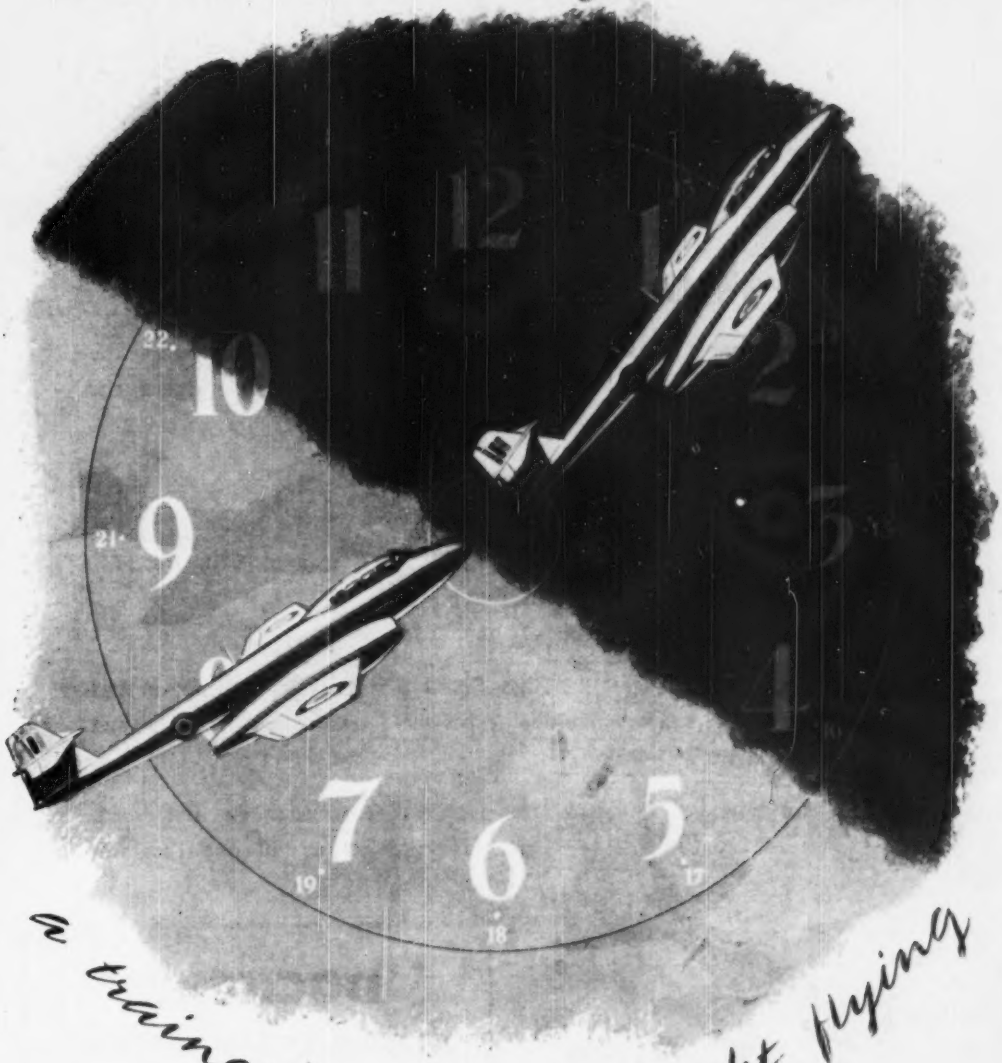
Russian allegations that "a B-29" was flying over Latvia on the day in question so far provide the only clue to the Privateer's disappearance. The Russians claim that U.S. aircraft opened fire on Soviet fighters, which counter-attacked, driving it out to sea. American authorities point out, however, that the Privateer was unarmed, and that it was not likely to have been over Latvia, some 300 miles off its course.

American Mass Air Manœuvres

SOME 60,000 troops and 600 aircraft will be employed in the airborne manœuvres, the largest ever held in peace-time, planned by the U.S. Services to take place in late April and early May. Known as Exercise *Swarmer*, the operation will consist of an attempt to seize an "airhead" in North Carolina and maintain it entirely by air transport and supply.

Initially, 8,000 paratroops will attempt to capture an airstrip for supporting transport and troop-carrier aircraft. Landing, by "D-Day plus three" at a

All in the day's work

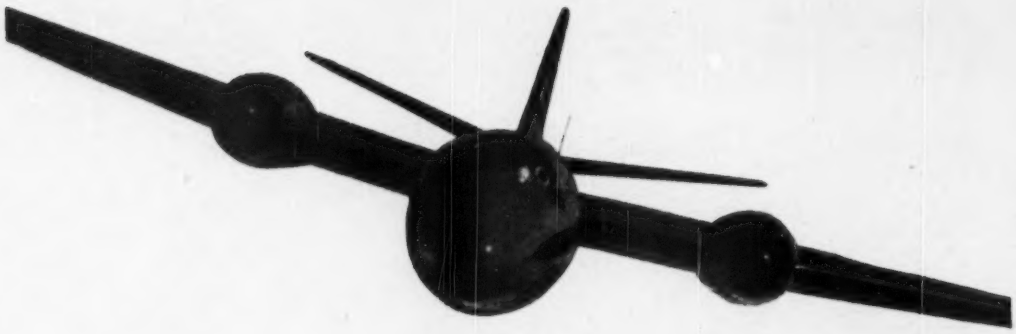


a trainer . . . . . for night flying

Four jobs in one—and more to come

GLOSTER METEOR

GLOSTER AIRCRAFT CO LTD (MEMBER OF THE HAWKER SIDDELEY GROUP)



FROM ANY ANGLE

the first thing people notice about the English Electric *Canberra* is the finish—the sheer beauty and purity of its colour. From the outset the designers specified

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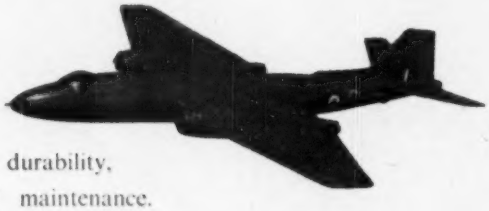
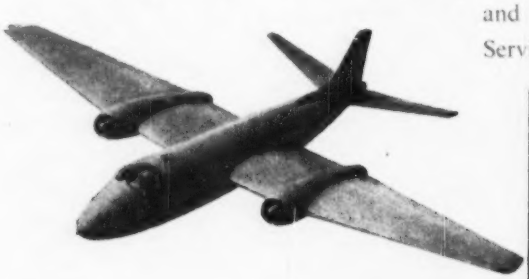


because they required a high degree of aerodynamic cleanness and durability, speed of application and ease of maintenance.

Based on Dockers' famous C.R. High Speed Finish, this specification has proved itself in 4 years' intensive experience on record-breaking and production jet aircraft.

Principals are invited to draw on Dockers' experience in this field, and to make full use of our Technical Service.



DOCKERS'
AIRCRAFT FINISHES
FULLY A.I.D. AND A.R.B. APPROVED

Photographs by courtesy of 'The Aeroplane' and The English Electric Co. Ltd.

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Makers of Paints, Lacquers and Varnishes for every purpose

LADYWOOD · BIRMINGHAM · 16

HERE AND THERE . . .

rate of five a minute, the latter are expected to fly in 30,000 troops, 14,000 tons of equipment and 12,000 tons of supplies. In overall command of the exercise will be Lt.-Gen. Lauris Norstad, a former U.S.A.F. Deputy Chief of Staff for Operations.

Parachute Patents Infringed

IN an action taken by Irving Air Chute of Great Britain, Ltd., against Societe Lemercier (Aviation Department), judgment was given for the plaintiffs by the Civil Tribunal of the Seine, Paris. It was held that the parachute harness known as Lemercier Type 200 constituted an infringement of certain Irving patents.

The defendants were prohibited from manufacturing or selling these harnesses, and were ordered to pay to the British company damages of about £1,000. An expert was instructed to evaluate other sales that might have been made by Lemercier and to calculate corresponding damages.

Avons for Australia?

DURING his visit to Australia, Mr. E. W. Hives, the managing director of Rolls-Royce, Ltd., is reported to have recommended the Commonwealth Government to modify its plans for producing Rolls-Royce turbojets.

He urged production of the Avon unit, it is said, in preference to the Tay, as he considered it unlikely that the R.A.F. would adopt the Tay, although a decision was not yet final. The Avon was a suitable power-unit for the three projected Australian-built jet aircraft (the Canberra, the C.A.C. all-weather fighter and a Hawker jet fighter), and standardization between the R.A.F. and R.A.A.F. was considered essential.

NEWS IN BRIEF

THE rapid starting characteristics of the two Rolls-Royce Derwent turbojets contributed greatly, says the Gloster Aircraft Company, to the quick turnround achieved by the Meteor 8 which recently set up three records between London and Copenhagen.

* * *

Petroleum Films Bureau (29, New Bond Street, London, W.1) have issued a new catalogue of their 16- and 35-mm sound and silent films. Aviation subjects include *How an Aeroplane Flies*, *British Aircraft Review* (1948 and earlier editions), *Airscrew*, and—dealing with the conversion of tankers into merchant aircraft-carriers—*M.A.C. Ship*.

* * *

At the annual general meeting of the Belfast Branch of the Royal Aeronautical Society, it was reported that the membership was now 262, an increase of 70 over the previous year. The £10 prize for the best paper on civil aviation written by a Branch member had been awarded to Mr. F. P. Youens, B.Sc., A.F.R.Ae.S.

* * *

The Sperry Gyroscope Co. has obtained an additional 100,000 sq ft of factory space by leasing a large part of the buildings at Feltham previously occupied by the General Aircraft Co., Ltd. The new factory space is very nearly as large as the present Brentford, works, and the intention is to make the Feltham factory a machining plant.

* * *

The report of the first annual general meeting of the Engineer Buyers' and Representatives' Association states that membership now extends to Burma, Egypt, India and Thailand. Three new branches have been sanctioned by the Council, of which two—one for south-west England and South Wales, and the other for Lancashire, Yorkshire and north-west England—would be formed within the next two or three months.

* * *

The largest rubber research centre in the British Commonwealth will, it is announced, be opened at Fort Dunlop on June 7th by Sir Lawrence Bragg, Cavendish Professor of Experimental Physics, Cambridge University.

* * *

As from April 1st, the Rentrew Foundries' resident engineer in the Midland area will be Mr. W. O. Gascoigne, 28, Priory Road, Kenilworth, Warwickshire. Telephone number: Kenilworth 710.

* * *

Henry Wiggin and Co., Ltd., Wiggin Street, Birmingham, 16, have produced a new publication, *K. Monel—Physical and Mechanical Properties*, which gives comprehensive data on this precipitation-hardening nickel-copper alloy.

* * *

Valay Industries, Ltd., 186, Campden Hill Road, London, W.8, state that successful results have been obtained by British European Airways by using "Jove" wax-spray polish for aircraft exterior-surface cleaning. It is claimed that the method provides a corrosion-resistant coating with a much smaller expenditure of time than is demanded by orthodox wax-polishing methods.

* * *

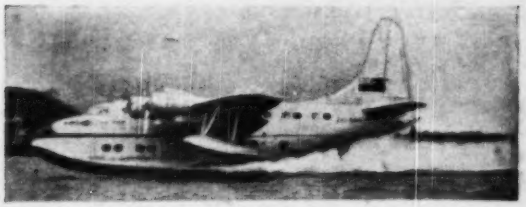
A. Cdre. Colin S. Cadell, managing director of International Aeradio, Ltd., is now back from his 20,000-mile survey of the company's activities. He visited Rangoon, Bangkok, Singapore, Karachi, Basra, Baghdad, Damascus, Beirut, Cairo and Nairobi, and during the tour concluded arrangements for the establishment of an International Aeradio office in Singapore (at 65, Chulia Street) under Mr. R. A. Willoughby.

TAYLOR AEROCAR

ONE-MINUTE conversion from car to aircraft is claimed for the Taylor Aerocar two-seater, illustrated below. Designed by Moulton B. Taylor (left), the Aerocar is now undergoing C.A.A. certification tests, and, subject to successful completion, 12 models are to be built for sales and demonstration purposes. A quantity-production price of £1,000-£1,400 has been quoted.

For both ground and flight operation the power unit is a single rear-mounted 100 h.p. Franklin engine. As a car, the machine's speed is 50 m.p.h.; it has front-wheel drive, hydraulic brakes, three forward speeds and reversing gear. The "flight component"—consisting of wings, fuselage, tail unit and shaft-driven propeller—can be towed from city to airport, and has two small retractable wheels in the wing-roots for this purpose. In the air the Aerocar's cruising speed is 100 m.p.h.

A model of the Saro S.R.45, the prototype of which is due to fly in the summer of next year.



The Short Solent, a post-war civil development of the Seaford and Sunderland military flying boats.

THE CASE for the FLYING-BOAT

A Protest Against its Withdrawal from British Commercial Aviation—and an Analytical Comparison with Landplane Economics

THIS article is contributed by one who is now concerned with British flying-boat construction and operation. Though FLIGHT has consistently supported the claims of this type of aircraft as a comfortable, safe, reliable and—properly operated—economical means of transport, we do not necessarily subscribe to every one of our contributor's arguments. It may well be that exponents of the opposition case will find loopholes in his reasoning: if this is so, we shall be pleased to afford space for their comments.

PUBLISHED views upon the recent decision by B.O.A.C. to withdraw its flying-boats from service have so far been confined mainly to sentimental appeals, general assertions or mere statements of opinion. The fact remains that the decision can have a world-wide influence on the future of this type of aircraft. Left unqualified, it is liable to react in such an unfavourable way upon the flying-boat in that other airline operators, who are bound to have their opinions influenced by the actions of one of the world's major airlines, will tend to assume that the flying-boat of the present day is no longer competitive.

Mr. Lindgren, when Parliamentary Secretary to the Ministry of Civil Aviation, levelled the charge, among others, that flying-boat operation is expensive—a very unsatisfactory statement. It is only fair, then, to examine the flying-boat not in its rôle of a luxurious form of transport but in the light of its operating cost as compared with that of the landplane. By a direct comparison of two modern aircraft in service today (a flying-boat used by B.O.A.C. and T.E.A.L. and a landplane of similar capacity in operation on the trans-Atlantic route and on other services all over the world) it can be clearly shown that, aircraft to aircraft, the flying-boat differs so little from the landplane that, if the charge of expensive operation is to be maintained it must revert to the operators themselves and not to the aircraft. This leaves clear for examination the only other question which can be considered to be included in the overall operational costs—that of maintaining marine bases which, together with the strategic problems involved, will be mentioned later in this article.

Direct Operating Costs.—Calculations can be based on the S.B.A.C. standard method for obtaining the direct operating costs of aircraft, and they are reproduced in abbreviated form on the opposite page. The landplane referred to can carry a maximum of 60 passengers, but to accommodate this load the normal amenities such as toilet and galley have to be removed; for comparison with the flying-boat, however, these facilities have been allowed to remain, and the passenger load is accordingly reduced to 44. The flying-boat, equipped with toilets, galley, cocktail bar, etc., carries 45 passengers.

The data for comparision have been subjected to the most careful scrutiny and the direct operating costs have been based on a stage distance of 1,220 nautical miles (1,300 statute miles) in still air. Launching and beaching for the flying-boat and ground-handling for the landplane have both been taken into consideration under the heading of maintenance and overhaul of airframe and equipment.

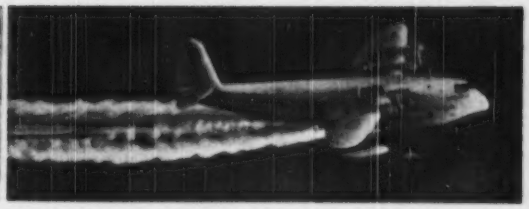
From these calculations it can clearly be seen that the total difference in operating cost (a matter of .04 pence per passenger mile in favour of the landplane) is so small that it can be considered negligible. Experience with this type of flying-boat has shown that these figures are quite unfair to it. The S.B.A.C. formula demands that a figure of 0.9 man-hours per flying-hour be required for the maintenance of every 1,000 lb of equipped airframe weight and, based on the given E.A.F. of 34,784 lb, this indicates that approximately 31 man-hours per flying hour are required. Latest maintenance statistics show that in actual service the figure required is far less than this, being given as 8 man-hours per flying hour, which is not for airframe and equipment only, as provided for in the S.B.A.C. formula, but also includes maintenance of power plants and airscrews.

Thus it can now safely be stated that the reference to expensive operation by Mr. Lindgren must refer entirely to the cost of the bases, an expense which cannot be afforded under present conditions. With this contention one cannot but agree, although reservations must be made.

Basis for Bases.—A marine airport becomes a prohibitive overhead expense only where it duplicates a landplane base, but where a route is operated exclusively by flying-boats the cost of bases is a normal overhead which can be taken into account when fixing fares and charges. For instance, on the South African route the flying-boat calls at many places where no landplane bases exist; consequently the decision to withdraw flying-boats will have severe repercussions upon these places. Runways and buildings will now be needed, and their cost can never be covered by the minute difference shown in the operating costs between the flying-boat and the landplane. Such an instance was given in a recent statement by Mr. Halstead, Minister of Commerce to the Government of Southern Rhodesia, when he expressed himself as being strongly dissatisfied with the B.O.A.C. decision; his Government has recently allocated £1,000,000 for an irrigation dam of prime importance to the country and which would at the same time have formed an ideal flying-boat base convenient to the capital city. Now they are also committed to a similar sum for the purpose of laying down runways and erecting airport buildings for, as Mr. Halstead personally put it, "someone else's Constellation to use."

That marine bases are far from involving the high expense that is claimed by B.O.A.C. is proved once again by the example of T.E.A.L., who, operating a direct route from Auckland to Sydney with Solent Mk. 4s, can offer travel at

The Short Shetland II of 1947, originally designed for long-range reconnaissance and military transport.



The Short C-class flying-boat, which gave exceptional service on Empire routes. The prototype first flew in 1936.

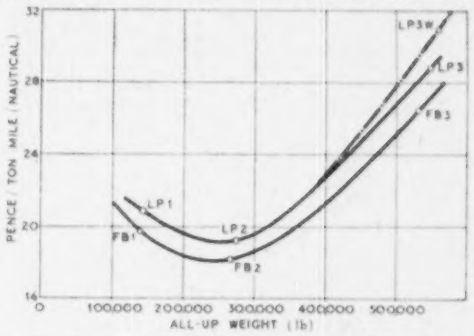
the profitable rate of 4½d per mile return—probably the lowest air fare in the world.

We can now consider the problem of why flying-boat services and bases should be maintained where landplane services and airports also exist, and the answer to this falls into two categories—future trends and air strategy.

Future Trends.—Turning to the future, the commercial field takes on quite a different aspect, and it is a matter of plain common sense that, if air traffic is increased, fares must be brought into a more competitive line with surface transport. This can be made possible only by government subsidy on an enormous and impracticable scale or by adopting large units carrying many passengers.

When considering the very large aircraft of the future, the economic arguments for its taking the form of a flying-boat are numerous. First, we must examine the two specifications in existence today that were laid down by the Brabazon Committee in the autumn of 1943, namely the Bristol Brabazon landplane and the Saunders-Roe Princess flying-boat. To date the Brabazon has cost the country more than £11,000,000 for the construction of the aircraft, for hangarage and for new runways. In contrast, the *three* Princess flying-boats will cost the taxpayer just over £7,000,000, despite the fact that production delays have occurred, partly in the development of suitable engines. This is a comparison of first costs only, but the possibility of the Brabazon ever carrying the payload capable of restoring even a fraction of its initial cost is too remote to be considered. On the other hand, it is already expected that the Princess flying-boats should, within the first year of their operation, repay £1,000,000 of their initial

Earlier in this article we examined, by calculation, the cost of two aircraft in the 80,000 lb all-up weight category. Now, suppose we push the weight up to 200,000-3,000,000 lb, the narrow margin between the flying-boat and the landplane will increase well in the favour of the flying-boat.



Comparative curves of operating costs for representative types of flying-boats and landplanes of different weights operating over a stage-length of 2,880 nautical miles. LP3W is a landplane with restricted wing loading.

Twelve months ago the Keith-Lucas lecture, given before the Joint Aeronautical Symposium held in America under the auspices of the I.Ae.S. and the R.Ae.S., showed quite clearly, by a design study of aircraft, that in the larger sizes the flying-boat becomes the more efficient aircraft, and that at 270,000 lb all-up weight the landplane loses the advantages of speed and shows only 3½ m.p.h. over the flying-boat, while weighing nearly 2 per cent more. For the still larger size of aircraft, in the region of 540,000 lb, the flying-boat is over 3 per cent lighter than the landplane and, at the same time, is just a fraction faster. Apart from this, the landplane of the former all-up weight would, for safety, need a runway of at least 3,000 yards, whilst the latter would require 3,600 yards—in tropical countries longer still. Thus, with the very minimum average cost of each airport somewhere between 25 to 30 million pounds, the flying-boat must come back into its own on all-round economic grounds, for the cost of a marine base, however well equipped, is only a fraction of the cost of a land airport.

It is highly improbable that any existing airports, other than Idlewild and London Airport, could handle aircraft of 200,000 lb a.u.w. or more without at least considerable extension of existing runways. The construction of outsize airports is, for many of the smaller countries, at present next to impossible.

Flying-boat bases in use to-day could handle ultra-large

COMPARATIVE DIRECT OPERATING COSTS FOR A STAGE-LENGTH OF 1,220 n.m.

	£ per a/c flying hour	
	Flying-boat	Land-plane
ANNUAL COST		
Equipped airframe and spares	5.68	8.21
Power-plants and spares	2.00	2.25
Airscrews and spares	.17	.22
Insurance	4.22	5.7
Total Annual Cost	12.07	16.38
FIXED HOURLY COST		
Maintenance and overhaul:—		
Airframe and equipment (including 3/10ths reduction in flying-boat for lack of undercarriage.)	13.37	21.97
Power-plants	17.72	19.66
Airscrews	1.05	1.63
Total Fixed Hourly Cost	32.095	43.26
VARIABLE COST (Basis of calculation)		
	Flying boat	Land-plane
Total fuel consumption (gall) on 1,220 nautical mile stage (includes taxying, take-off, climb, circuits and 3% contingency allowance.)	1,712	1,728
Time for stage (hr)	7.261	5.76
Consumption (gal/hr)	236	302
Stage speed (kt)	168	213
Total weight of fuel and oil carried (incl. 35 min. stand-off, 5% contingency allowance and 200 n.m. diversion) (lb)	15,450	16,700
Basic operational weight plus fuel, crew and oil (lb)	65,782	82,300
Payload (lb)	13,218	13,740
Number of passengers	45	44
Weight of passengers and baggage	10,805	10,560
Weight of mail and freight (lb)	2,413	3,180
Costs per flying hour on foregoing assumption :—		
Cockpit crew	10.02	10.02
Fuel and oil	33.1	42.4
Landing fee (appropriate to a/c-weight) stage-time	4.06	2.32
Total Variable Cost	47.18	54.74
TOTAL COST PER FLYING HOUR	91.345	114.38
Cost per ton-mile (nautical)	22.1	21.2
Costs per passenger-mile (nautical)	2.37	2.27

THE CASE for the FLYING-BOAT . . .

aircraft with comparatively small expenditure. For example, it has been estimated by B.O.A.C. that less than £100,000 will be required to furnish their base at Hythe with extended facilities for the handling of the Princess class flying-boat. It can be said that whereas not only new runways but new hangarage will have to be provided and maintained for large landplanes, in the case of flying-boats the "runways" are free and the capital expenditure is solely for buildings, slipways (where required) and hard standing. If, then, the large flying-boat is to be the basic air transport of the future, B.O.A.C.'s decision means that to-day's landplane operators will be faced with the difficulty of adapting themselves to the new commercial trend with little or no experience of this form of operation. In addition, they will be devoid of maintenance personnel experienced in this class of work, and also of aircrews.

Strategic Value

The Military Aspect.—Now let us examine the point of view which probably has the greatest effect upon the official attitude to the flying-boat—military strategy. Here again we can put forward a strong plea for the retention of the flying-boat bases by the Government on strategic grounds alone, for the comparative invulnerability of a marine base as compared with an airfield is self-evident.

During the last war, after the fall of Singapore, a vital supply line was kept open by the "C" class flying-boats when no landplane base was available. The Japanese having occupied the majority of territories in direct line with the Middle East and Australia, there still remained marine bases, often merely strips of smooth water served by primitive boats carrying oil drums and other supplies, where the operation and servicing of flying-boats was possible.

It is not implied that the main factor of wartime transport and supply should be by flying-boat alone, but it is obvious that water-borne aircraft are valuable enough reinforcements to warrant that the existing facilities should be maintained by way of Government subsidy or direct ownership. What, then, is to prevent all present flying-boat bases being maintained by the Government and thus relieving the operator of their cost?

It should not be overlooked that the United States, though not employing the flying-boat upon commercial airline work, have augmented their military programme with substantial orders for the development and supply of the Martin Mars and other types of marine aircraft.

Flying-boats and the Shipping Lines.—That the larger aircraft are bound to come must be accepted for, apart from reasons of range and payload, the proportion of persons travelling overseas who would normally travel by ship but who now go by air, has already reached 15 per cent, and is still on the upward trend. Taking into consideration the ample convenience offered by ship travel, together with the facilities provided and the social atmosphere engendered to while away the tedium of ocean crossing, this fact indicates a marked preference for the speed offered by air travel.

It would not, therefore, be assuming too much to assert that, if airliner capacity were to be doubled, with the same frequency of service, then the proportion could rise as high as 30 per cent, and perhaps even higher *pro rata*. Operating on this basis, an airline would be in a position so to reduce fares as to become directly competitive with ship travel.

In the past, shipping companies have displayed interest in air transport. We have already shown how increases in capacity and size are best and most economically attained by the use of a waterborne aircraft. If, then, the flying-boat is (erroneously) out of favour with the chosen instrument of civil aviation in Great Britain, there presents itself an opportunity for a non-scheduled series of services, operated on a scale large enough to permit the specifying and ordering of specialized aircraft; and who better fitted to undertake the formation of a merchant fleet of the air than those skilled and experienced in the building up of Britain's merchant navy?

Need for Compromise

It has been shown that flying-boats can be operated as economically as can contemporary landplanes, and it should be understood that, from the operator's point of view, the term "economic" covers utilization which, in turn, incorporates relative speeds. But if air travel is to remain with the airlines solely, the contention is that, even though to retain flying-boats (in full or token services) would to-day entail the sacrifice of a portion of revenue, the operators would certainly not be faced with a complete deficit; the next few years would see their investment amply rewarded by the speed and facility with which they could commence operations with very large flying-boats of a size to put them on a competitive basis with shipping.

Conclusion.—From the foregoing, the conclusion to be drawn is that it is imperative, at this time, to reach a compromise between the landplane and the flying-boat. It is not enough to accept the glib assurances of the men at the top that flying-boats are uneconomic. It is certain that a full fleet, operated correctly, could at least break even; and why should not an approach be made to the various countries served by flying-boats in order to reach an agreement to share the cost of marine bases? To kill the flying-boat now will surely store up trouble for the future.

A.S.T. CEREMONY

AT the Hamble headquarters of Air Service Training last Friday, April 14th, A.V.-M. R. L. R. Atcherley, C.B.E., A.F.C., Commander-in-Chief of the Royal Pakistan Air Force, inspected the R.P.A.F. contingent who are undergoing training at what has been described as Britain's air university.

There are, at the present time, 425 students at A.S.T., this bringing the total number who have passed out since the war up to the considerable total of 1,729. These figures, when regarded in proportion to the total number of students who have taken courses since A.S.T.'s inception in 1931—something over 3,100—give a clear indication of its progress.

As may be imagined, English is by no means the only language which can be heard at Hamble; in point of fact, the post-war A.S.T. courses have been taken by students of no fewer than 39 nationalities. The greater proportion of the foreign entry is, however, Indian; although the present strength includes 12 Pakistani civilian students, in addition to the 30 officers and 20 N.C.O.s and other ranks from the R.P.A.F. The officers are taking the two-years technical course, which is the full equivalent of the engineer officers' course in the Royal Air Force, whilst the N.C.O.s and airmen are taking the 12 months' radio engineering course.

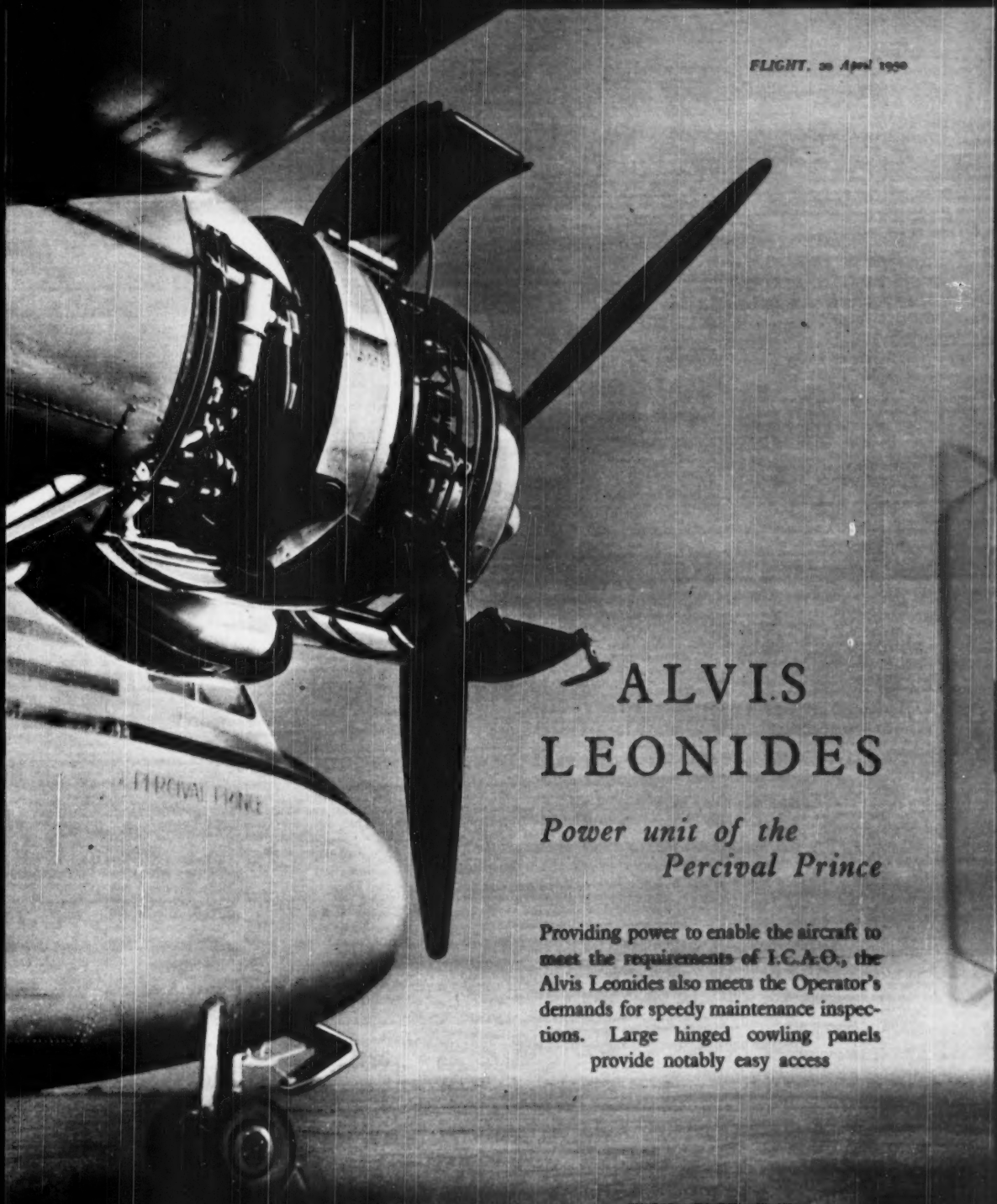
For the C.-in-C.'s inspection it was a pleasant spring day with a cool, gentle breeze and sun-haze clouds, and the R.P.A.F. contingent were drawn up in rigid lines before the saluting base on the tarmac in front of "A" hangar. Above the rostrum, the R.A.F. ensign and the flag of Pakistan stirred lazily in the breeze. Having received the salute, A.V.-M. Atcherley made his inspection and then, in company with A. Cdre. R. G. Bowditch (Director of Maintenance and Supply, R.P.A.F.) G/C. M. Rabb (Air Adviser to the High Commissioner of Pakistan) and S/L. F. M. Ahmed (staff officer), the C.-in-C. watched the march-past.

SIMMONDS AEROCESSORIES PROGRESS

EXPANSION of their production and sales organization at home and abroad is announced by Simmonds Aerocessories, Ltd. Production has been increased under the direction of Mr. L. G. Oxford (who has recently visited a number of American plants and has now been appointed joint managing director) and Mr. C. J. Turner (works manager). Mr. E. S. Mead now becomes general sales manager of the five sales divisions.

Mr. C. Rosier, general manager of Simmonds Aerocessories, Pty., Ltd., Melbourne, recently visited this country, and from May 1st his company will handle sales of Fram oil cleaners; Spire Speed Nuts are now being manufactured in Australia.

In Sweden, a sales office has been opened in Stockholm under the direction of Mr. Curt Edgren; and South African sales representation is to be extended following a visit by the company's chairman, Mr. C. W. Hayward.



ALVIS LEONIDES

Power unit of the Percival Prince

Providing power to enable the aircraft to meet the requirements of I.C.A.O., the Alvis Leonides also meets the Operator's demands for speedy maintenance inspections. Large hinged cowling panels provide notably easy access

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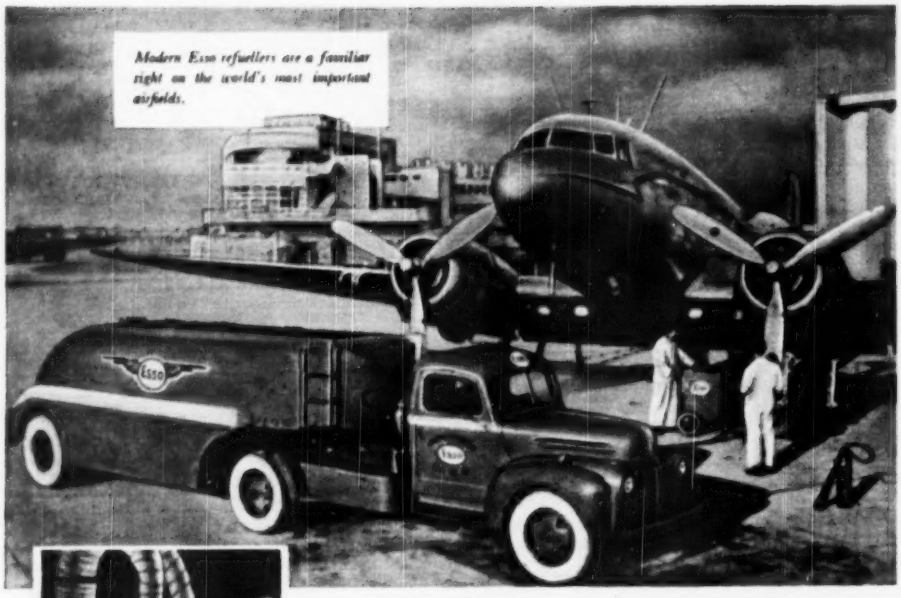
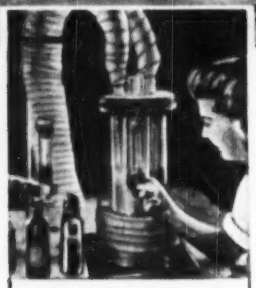
ALVIS



Modern Esso refuellers are a familiar sight on the world's most important airfields.



Low temperature viscosity tests enable Esso scientists to observe the behaviour of oils at under temperature conditions at very high altitudes.

Esso Serves Aviation

New aeronautical designs and revolutionary methods of propulsion are giving greater comfort in flight; longer distances are now covered at higher speeds. Every step in increased performance has demanded marked improvements in Aviation Fuels and Lubricants. Additional measures of safety, too, are required, many of which have been made possible by the Hydraulic and De-Icing fluids pioneered for so long in the Esso Laboratories. Esso scientists, at this moment, are planning Aviation Fuels and Lubricants even better than the many notable products which they have been the first to introduce.

Over mountain ranges, above clouds and in extreme cold, modern airliners cruise in safety. Esso aviation fuels and lubricants are playing their part.

ESSO
AVIATION SERVICE

ANGLO-AMERICAN OIL COMPANY LIMITED

LONDON TO MANCHESTER 1910

Fortieth Anniversary of an Epic Day-and-night Cross-country Contest : Claude Grahame-White Recalls his Experiences for "Flight"

This is the story of a flying contest that gripped the imagination of the whole country when, in April, 1910, Louis Paulhan, the great French aviator, won "The Daily Mail" prize of £10,000 for the first flight from London to Manchester to be completed within 24 hours; and of Claude Grahame-White's gallant failure, in the course of which he made the first night cross-country flight by a heavier-than-air machine.

In the following pages, Harry Harper, veteran aviation journalist, tells how he followed the contest by road—not an impossible feat in the days of 40 m.p.h. flying speeds; then Grahame-White himself, in an article written within the last few weeks at the invitation of the Editor, gives his own vivid picture of "flying by Bradshaw" 40 years ago.

From the Ground

By . . . HARRY HARPER

ONE evening in April, 1910, I was in the reporters' room of *The Daily Mail*, when the telephone rang and I found that Harold Perrin, secretary of the Aero Club (not yet "Royal") wanted to speak to me. He told me he had just received another entry for the £10,000 prize offered by the newspaper for a 183-mile aeroplane flight from London to Manchester.

For the moment, however, this news did not rouse me to much enthusiasm: We had already had several entries which, when it came to brass tacks, had petered out somewhat disappointingly. But Harold assured me this was going to be something different. The entrant—Claude Grahame-White—was, he said, quite an exceptional fellow, a regular "human dynamo." And Perrin proceeded to sketch, briefly, what this young man had already done. Hurrying over to the world's first air meeting at Rheims, he had acquired a monoplane from Louis Bleriot, and had made straight flights in it after only twenty minutes' taxying. Then, at Pau (as he himself relates in his own story in the following pages), he had passed the tests necessary for an official pilot's certificate. After which, going to Mourmelon, he had bought a Gnome-engined biplane from Henry Farman (a Norfolk-born Englishman, living in France, who first flew—on January 13th, 1908—a circular 1 km course on a French Voisin.—Ed.). Now, hearing that more than one of the well-known French airmen had already got their eyes on the London-Manchester prize, he was bringing over his Farman from France, determined to be first to have a shot at the flight.

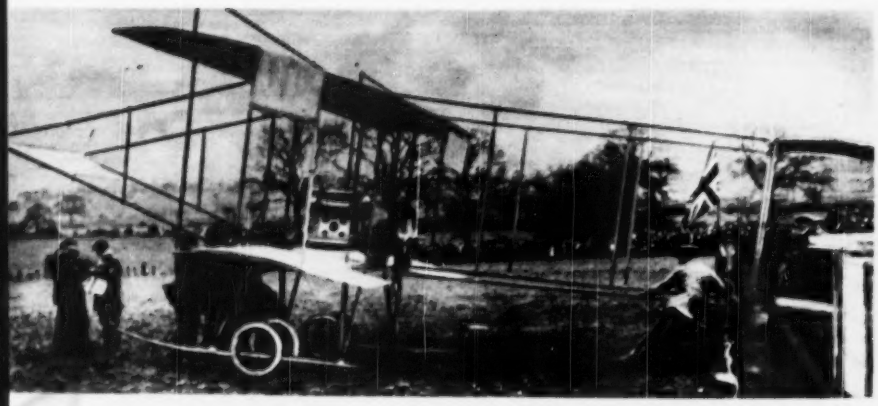
A day or so later I myself met Claude, and decided that this young man, quick and emphatic in both speech and action, was certainly one likely to get things done. I remember his chauffeur telling me, somewhat ruefully, that "G.-W." would start out hot-foot in the morning, on one or other of his projects, and would just keep going at top speed all day without even thinking of stopping anywhere for a meal.

"I sat on a seat entirely unprotected from the wind and weather"—Claude Grahame-White in his Henry Farman biplane—a *Flight* photograph taken shortly before the historical contest.

According to the rules of the contest competitors had 24 hours in which to complete the London-Manchester flight. They were also allowed two halts for refuelling. Another stipulation was that at the beginning of their flight they must pass within five miles of *The Daily Mail* office in London. Grahame-White decided to start from Park Royal and to fly in round the gasometers near Wormwood Scrubs in order to comply with the five-mile rule.

On the morning of his first attempt, April 23rd, I drove out in a big Daimler car with the pilot's mother, and his sister Beatrice, to a railway bridge at Willesden Junction, awaiting the moment when he would pass over us on his flight north. He left the ground shortly after 5 a.m. and soon we saw him flying towards us. I remember feeling worried at his flying so low. He seemed, in fact, hardly high enough to clear some of the neighbouring buildings. What had happened was that, with a full fuel load, and the wind behind him, he had found it difficult at first to get his Farman to climb. But after he had passed over us we could see he was gradually gaining altitude. Then we

Grahame-White being driven from the field near Lichfield in which he made his second landing during the first attempt. With him are his mother (left) and sister, while next to the chauffeur is Harry Harper, who has contributed the introduction to this story.



LONDON TO MANCHESTER 1910 . . .

On the right is Paulhan ; above, the Gnome engine of his Farman biplane being run-up before the take-off from Hendon.

just drove after him at our best speed. And I recollect how proud my driver was when our speedometer showed 40 miles an hour—which was just about Grahame-White's speed up in the air.

Though this was his first attempt at anything like a long cross-country flight—and was, incidentally, the first cross-country flight of any duration to be made in England—Grahame-White did very well on his first stage. At a point near Rugby a white mark had been put down in a field, and here he landed to refuel, resuming his flight an hour later.

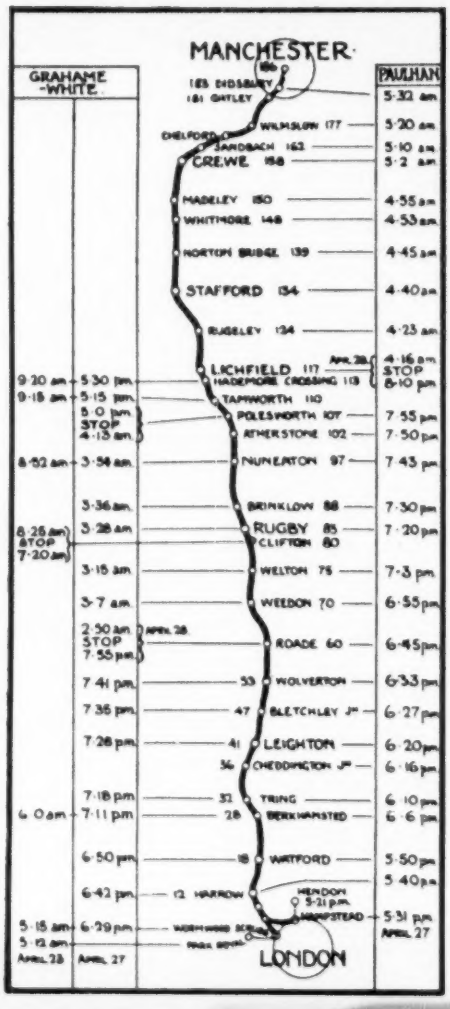
By now, although weather conditions were good for the time of year, I noticed that a gusty wind was getting up. This would have meant nothing to machines of a later design, but the Farman, low-powered and slow-flying, was apt to wallow badly when there was anything like a wind, making it hard work for the pilot to keep it under control. Grahame-White found the wind increasingly troublesome. Battling his way on towards Crewe, where he had intended to make his next stop, he was approaching Lichfield when his Gnome showed signs of valve trouble. This meant that, his speed being reduced, the effect of the wind became more pronounced. It was not long, in fact, before he decided on making a landing. This he achieved successfully in a field close to Hademore Crossing on the railway outside Lichfield.

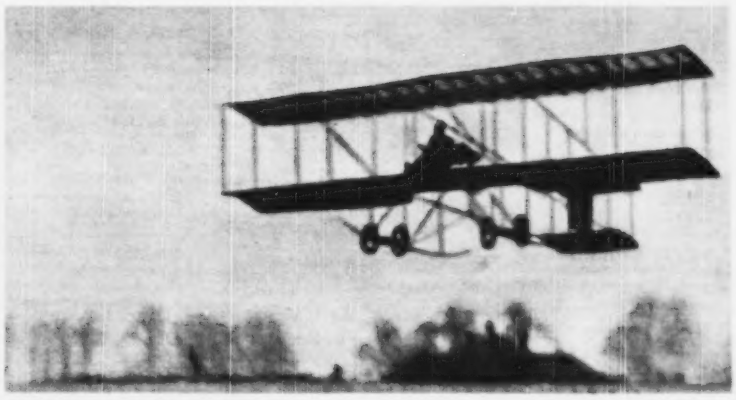
His chances still looked good, if only the wind would drop. And while a French mechanic worked on the Gnome, Grahame-White motored with me into Lichfield to have a meal and a short rest. Before leaving the field he had given instructions that his machine was to be pegged down to avoid any risk of its being overturned by the wind. But for some reason there was delay in taking this precaution. Suddenly a heavy gust caught the biplane, and before anything could be done it was turned completely over, being damaged extensively, and rendered quite unfit for any further flying that day. This mishap was particularly unfortunate, seeing that foreign rivals might soon be on the scene.

Grahame-White grappled with the situation with his customary energy. The damaged biplane was dismantled at once and sent by special train to London, being then taken to the airship shed on Wormwood Scrubs for repair. Working night and day, Grahame-White and his helpers had the machine airworthy again late on April 26th.

By now, however, a formidable rival had appeared in Louis Paulhan, a far more experienced pilot than Grahame-White could claim to be at that time. And we heard that Paulhan was bringing with him a Farman with a shortened lower wing—making the machine faster than the one

The story in a map—published in *Flight* at the time.





(Left) Henry Farman discusses his biplane with Grahame-White. (Right) The British pilot takes off on the first of his gallant attempts.

in which Grahame-White was about to set off again.

Paulhan established himself in a shed in the field at Hendon which became the famous London Aerodrome.

On April 27th both flyers were ready. Again, however, the wind was gusting in a way distinctly unfavourable for early "box-kite" flying. But as evening came, and it looked like lulling a little, Paulhan suddenly decided that he would make a dash for it. Directly his Gnome had been run up he was in the air at 5.31 p.m., climbing to get out of heavy ground gusts.

The Englishman, wearied by the repair-work on his machine, had gone across for a rest to an hotel at Wormwood Scrubs when a car came dashing up with the news that his French rival had started in spite of the wind. Grahame-White sprang up, and his subsequent departure was made with such speed that it reminded me of the turn-out of a fire-brigade.

Dashing across to the airship shed, Claude had his machine brought out at the double. Springing into the pilot's seat, he waited only long enough to make sure the Gnome was doing its stuff; then, at 6.29 p.m., he shot off in pursuit of Paulhan, his machine dipping and swaying in the gusts which still swept across the Scrubs.

On this second dash north I had an experience I am not likely to forget, driving in a powerful White steam-car with that well-known expert on this type of car, the late "Freddy" Coleman. And did this big steamer move that evening? It surely did. And the uncanny part of it was that it was almost noiseless. It tore along the roads with nothing more than a faint hiss from its powerful engine and the swish of its tyres on the road. Other cars were streaming north that evening, but that vehicle just swept past them with a disdainful whiff of steam.

As Grahame-White flew on the wind moderated, and he made good progress. But the fact that he had started an hour later than Paulhan now began to tell its tale. By the time he was approaching Roade, nearly 60 miles from London, twilight was giving place to darkness and, seeing a suitable field below, he reckoned the only thing to do was to alight while visibility was still good enough to get down without trouble. Making a good landing, he hurried to the nearest railway signal-box to find out what Paulhan had been doing. Here he learned that the little Frenchman, with more daylight in hand, had reached Lichfield, 117 miles on his journey to Manchester. So now the position was that Grahame-White was just on 60 miles behind his rival with the prospect that, when daylight came, Paulhan would, bar accidents, reach Manchester first.

In the house of a doctor at Roade, and while enjoying a supper of bacon and eggs, Grahame-White held a council of war with his advisers. The result was that, in an endeavour to regain his lost ground, he decided to take what was then the very big risk of making the world's first night flight in a heavier-than-air machine.

He had his machine drawn back near a hedge at one end of the field, while at the other, to help him judge his take-off, the hedge was illuminated by the lamps of bicycles and the headlights of cars. It was in pitch darkness, at 2.45 a.m., that we saw him taxi out to make quite a good take-off.

Coleman and I, in the White steam car, had gone ahead along a road to Manchester, shining our headlights of our car on the whitewashed wall of an inn at some cross-roads, hoping that this would be a useful guide to the pilot—as, in fact, it was. He came in low right over us, and we guided him farther along a road leading north until, sighting a goods train on the railway, he decided to follow that.

So he flew on until, with the coming of dawn, he reached the hilly Trent Valley area, where, with his still-heavy fuel load and an increasing wind, he found it impossible to maintain a safe altitude. And though he fought on courageously for a time, he was eventually forced down at Polesworth, ten miles short of the spot where Paulhan had alighted the previous night.

In the meantime Paulhan, having heard of the Englishman's desperate expedient of a night flight, had hurried out to his machine and, at the first glimmerings of light, had taken off on his final stage to Manchester. He himself, though already a pilot of considerable experience, had a very rough time indeed in the still-rising wind, being almost jerked out of his seat more than once. But he battled on with grim determination, and duly reached Manchester. His struggle with the wind had been so exhausting that, on alighting, he said that he would not be inclined to go through such an ordeal again for "ten times £10,000."

When news of his rival's success was flashed along the railway to Grahame-White—still wind-bound in the field at Polesworth—he sprang up in the back of a car, and called for three cheers for little Paulhan, and at the same time sent him a telegram of congratulation.

Though unsuccessful in this now historic contest, Grahame-White became our first really great public air champion, and this largely because of the sporting nature of his effort, and the gallantry of his night flight, and also because he was our first pioneer pilot to show that there was an Englishman who could enter into worthy competition with a Frenchman in the then new art of flying. Grahame-White became, in fact, such a popular figure that he would be quickly recognized in the streets, and cheered, while driving about London. Not only this, but an actor in a then popular revue impersonated him on the stage, while he also appeared as a picturesque figure in Madame Tussaud's Waxwork hall of fame. And what more could one expect than that? His own story now follows:

". . . the crowds were increasing in volume every minute . . ." Grahame-White's machine in the field at Hademore Crossing during the first attempt. It was later overturned by the wind.

LONDON TO MANCHESTER, 1910 . .

(Continued from previous page)

In the Air

By CLAUDE GRAHAME-WHITE

HAVING purchased a Bleriot Monoplane in the late autumn of 1909, I decided to qualify as soon as possible for my Pilot's Certificate, without which cross-country flying was prohibited. As the weather was unfavourable in Paris, where I took delivery of my machine, I sent it by rail to Pau, in the South of France, where a new aerodrome had just been constructed, and where weather conditions were almost ideal for a novice.

Within a fortnight of arriving at Pau I had taught myself to fly and had completed the qualifying flights and landing tests, and on December 16th, 1909, I obtained my *Brevet de Pilote*, issued by the Aero Club de France, subsequently confirmed by the F.A.I.

Being now anxious to be the first Englishman to attempt the London to Manchester flight, for which *The Daily Mail*, owned by Lord Northcliffe, had offered the munificent cash prize of £10,000, to be won by the first aviator of any nationality who completed the journey within 24 hours, I immediately began to formulate my plans to embark on this somewhat formidable cross-country flight.

The experience gained during my test flights convinced me that the Bleriot single-seat monoplane, fitted with a small three-cylinder, 25 h.p. motor, was quite unsuitable for the flight, and I decided to purchase a more powerful machine. Accordingly, early in January, 1910, I left Pau and went to Mourmelon, where Henry Farman had his factory. As soon as I had explained my plans, he enthusiastically agreed to build and deliver to me, within three months, one of his biplanes fitted with a 50 h.p. Gnome rotary motor, which at that time was the most powerful and reliable aircraft engine obtainable. This biplane was of a totally different type from the Bleriot monoplane, and I found it much easier to fly and control, due in a large measure to the increased motor power.

On the first day I took delivery at Mourmelon, I flew non-stop for one hour and twenty minutes, and also took my mother for a fifteen-minute flight, so she was one of the first women in the world to make a flight in an heavier-than-air machine.

It was now early April, 1910. I had the biplane dismantled and crated, chartered a special train to take it to Calais, a special boat for the cross-channel trip and another special train to get the machine from Dover to London, for having heard rumours that some French pilots were anxious to compete for this valuable prize, I felt I could not afford to lose any time by the ordinary means of transport.

In those early, pioneer days of aviation, no skilled or experienced aircraft mechanics were available in England, and I had to rely, more or less, entirely on the experience I had gained in the Bleriot and Farman factories during the construction of my machine; and this knowledge I found most valuable when I arrived back in England.

The machine was delivered at Park Royal, in north-west London, which was just a big, open, rough field. I had been unable to obtain permission to use Wormwood Scrubs, which was a far bigger, level and a more suitable ground in every way. By the afternoon of April 22nd, the machine was erected and the motor tested, and by late evening, when the wind dropped, I made a trial flight and was satisfied that all was O.K. and ready for a start at day-break next morning.

I arrived at Park Royal at 4 a.m. on Saturday, April 23rd, and found a large crowd awaiting my departure. As soon as it was daybreak the motor was started up and, after a few minutes to warm up, I took off at 5.19 a.m. and flew in towards Willesden Junction, where the late Cdr. Perrin, secretary of the Aero Club, stationed on the top of one of the gasometers, waved a large white flag to indicate to me that I had rounded a point within five miles of *The Daily Mail* offices in the City, as required by the regulations. I then turned and headed north over Willesden Junction Station and followed the London and North Western Railway Tracks towards Rugby, my first planned stop to refuel.

In those early days, there were no reliable aircraft instruments, and my machine was not fitted with any compass, altimeter, engine rev counter, or petrol-tank gauge, and no aerial maps were available, I therefore had to steer by the rails and other landmarks which I had personally selected on a railway observation trip to Manchester. As I sat on a seat entirely unprotected from the wind and weather, it was not long before I became quite numbed by the cold. After passing Watford I gained height and before reaching Bletchley I estimated that I was well over 1,000 feet up and was making good progress, when suddenly I came over very faint and was afraid that I might have to make a landing. I then remembered that I had put some bars of chocolate and a small flask of brandy in the outside pocket of my jacket, and, after eating some chocolate and having a nip of brandy, I felt better; my faintness passed off and I flew on to my pre-arranged landing place at Clifton, a village about three miles south of Rugby.

I soon saw the large white sheet which my mechanics had spread on the ground to indicate the spot on which I was to touch down, and in a minute or two I made a safe landing at 7.20 a.m., having made a very successful first hop of 83 miles. I was so stiff with the cold that I had to be assisted out of my seat.

Lord and Lady Denbigh, who had come from their home to meet me, very kindly drove me in their brougham to a nearby cottage, where I had some breakfast and a warm up. In the meantime, my mechanics had filled up the oil and petrol tanks, and at 8.25 a.m. I started off again, hoping to make my next pre-arranged landing at Crewe. Everything went well until I was nearing Nuneaton, but I was being tossed about a good deal and soon realized the wind had risen considerably. Before I reached Tamworth, I found it very difficult to hold my course and control the machine, and rather than risk damage I decided it would be prudent to land and wait until late afternoon, when the wind usually drops, to continue my flight to Manchester.

I saw what looked like a suitable field adjoining the railway and at 9.20 a.m. made a safe landing at Hademore Crossing, a few miles south of Lichfield and 113 miles from London, with only 68 miles to fly on to Manchester.

Within a few minutes of my landing, thousands of people swarmed around the machine and started writing their names all over the wings and other parts; some, more daring, even tried to remove parts as souvenirs, and I and my mechanics had great difficulty in preventing damage. I mounted the machine and addressed the crowd, asking them to act as good sportsmen and not to spoil my chances of completing the flight.

This seemed to have the desired effect for the time being; but, as the crowds were increasing in volume every minute, it became evident that more drastic measures would have to be taken to protect the machine, so I got a friend to telephone the commanding officer at the mili-

"... a large crowd had gathered ... and I immediately announced that Paulhan had arrived in Manchester." The Englishman leads a cheer for his victorious French rival.

The Editor of *The Daily Mail* entertained Louis Paulhan and myself at a banquet. ... I received a very handsome silver rose-bowl. Paulhan is on the extreme right.

tary barracks at Lichfield and ask him to be kind enough to send a company of soldiers to act as a guard. A large number of men soon arrived with stakes and ropes and quickly made an enclosure. I then requested the sergeant in charge to get some more rope and tent pegs and tether the machine down to the ground, as I was afraid the strong wind might damage it. I finally left the field about noon and went to have a meal and rest at an hotel at Lichfield.

This was the first cross-country flight I had ever made and the strain was probably greater than I realized, for I soon fell fast asleep. About 3 p.m. I was awakened by one of my friends, with the alarming news that a gust of wind had lifted the machine into the air and that it had crashed upside down.

I rushed out to the field to ascertain the extent of the damage and immediately realized that the entire biplane would have to be rebuilt.

I therefore telephoned the railway company at Crewe and ordered a 60-foot scenery van to be sent to Lichfield Station to take the machine to Willesden Junction, having in the meantime obtained permission to use *The Daily Mail* airship shed at Wormwood Scrubs in which to rebuild it. By superhuman efforts on the part of my mechanics and other assistants, we got the machine into the shed by Monday afternoon, April 25th, and under my personal supervision the whole time, by working day and night, we managed to get it rebuilt and ready for trial by the early morning of April 27th.

During these two days, Louis Paulhan, the experienced French pilot, who had just returned from California, where he had been making exhibition flights, arrived in London with a new Farman biplane, of a later model than the one I was using. Clearly, it had now become a close contest between the two of us; who would be first to reach Manchester and win the prize? This new entry caused great public excitement, and the Press made great publicity of this now international contest.

At 5 a.m. on April 27th, I brought my biplane out of the shed with the intention of making a trial flight after rebuilding, but the crowd (of some 25,000 people) was so dense and uncontrollable, that it was quite impossible to secure a space for a take-off. After appealing to them for some two hours without avail, I was forced to return the machine to the shed in the hope that they would then disperse. Having had no sleep for the last two days and nights during the reconstruction of the machine, I went at about noon to a nearby hotel and slept soundly until awakened by one of my mechanics at 6 p.m. with the information that Paulhan had started from Hendon at 5.21 p.m.

I hurriedly dressed and rushed over to the shed, where many thousands of spectators, having heard the news of the Frenchman's start, were anxious for me to get under way and this time immediately cleared a space for my take-off. Without any previous trial since the rebuilding, I started at 6.29 on the pursuit of Paulhan, who had 1 hr 8 min start on me.

I flew on until darkness rendered it essential for me to land while there was still light enough for me to pick out a suitable field; then, at 7.55, landed safely at Roade, in a field, adjoining the railway embankment, having covered nearly 60 miles from London.

I soon learned that at 8.10 Paulhan had landed at Lichfield, 117 miles from London, and was spending the night there. It was now quite evident that, unless I could overtake him before daybreak, I stood no chance of reaching Manchester before him.

No one had ever made an aeroplane flight at night, and with no instruments or guiding lights, and with no prepared landing grounds along the route, such a course was highly hazardous. I decided, however, to take this only chance of success, much against the pleadings of my mother and sister; and after making all kinds of preparations for the take-off in the dark, I eventually started from Roade at 2.50 a.m.

Owing to a heavy load of oil and petrol, I cleared the high railway embankment and telegraph wires only by a very narrow margin; then I turned north over Roade Railway Station buildings, clearing them by only a few feet. Just as I picked up the railway signal lights ahead, I put my left hand down to ease myself more comfortably in my seat; and, simultaneously, my engine stopped dead and a crash seemed inevitable. Suddenly I realised that the cuff of my heavy jacket must have caught the tumbler-switch which controlled the ignition; in the nick of time I switched on again, and to my immense relief the engine started at once.

The road here follows close to the railway for several miles, and I could see the headlights of hundreds of motor cars ahead of me. This gave me renewed confidence that I was keeping my course, for the railway signals were few and far between and it was too dark to discern the tracks.

As I flew on at a low altitude to try to pick up the signals, I eventually reached the hills and valleys which abound in this district, and, as dawn approached, I found that the heavy load of petrol and oil I carried made it impossible to gain sufficient altitude to negotiate the high ground ahead of me. Eventually, much to my disappointment, I was forced to land in a field adjoining the railway line.

I ran to a nearby signal box in order to telephone to Lichfield to stop my mechanics, who were making their way in cars to Crewe, and to notify them where I had landed. About an hour later, I was informed that Paulhan had taken off from Lichfield at 4.9 a.m. and had landed at Didsbury, a suburb of Manchester, at 5.30 a.m., one hour and twenty-one minutes later.

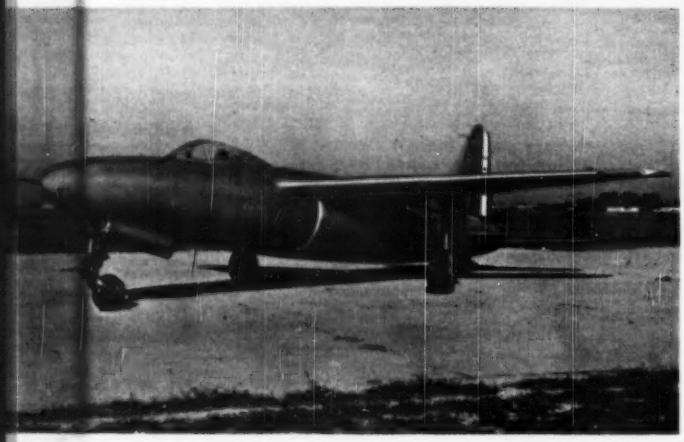
By now, a large crowd had gathered in the field where I had landed, and I immediately announced that Paulhan had arrived at Manchester and that the more experienced aviator had won the £10,000 prize.

A day or two later, the Editor of *The Daily Mail* entertained Louis Paulhan and myself at a banquet at the Savoy Hotel, London, when the winner was presented with a cheque for £10,000 and I received a very handsome silver rose-bowl in commemoration of the first aeroplane cross-country night flight.

The Centre N.C.1080 bears a resemblance both to the Supermarine Attacker and its "swept" development, the 510. As in all other French prototype fighters, the power unit is a Rolls-Royce Nene, as built under licence by Hispano-Suiza. Like the Arsenal V.G.90 and Nord 2200, illustrated below, this type has been built for the French Navy. All three were due to commence evaluation trials on April 1st.

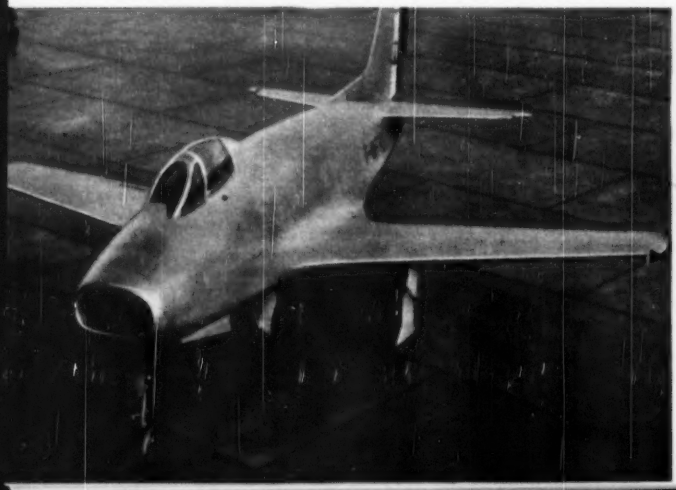
FRENCH JET PROTOTYPES

Three Nene-powered Fighters for the French Navy, and a Twin-Derwent Research Aircraft, Feature Moderate Sweep-back on Wing and Tail Surfaces, and Provide an Interesting Study in Intake Design

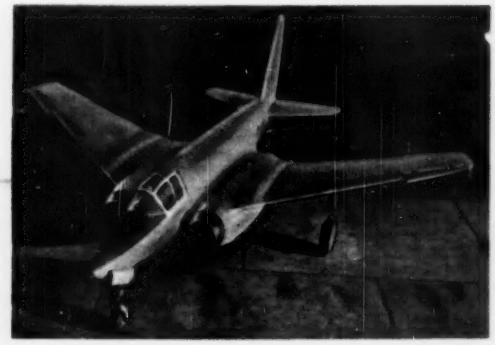


The Arsenal V.G. 90 (left) is seen to resemble strongly the V.G. 70 research aircraft, though the intakes are disposed laterally, whereas the V.G.70 has a ventral intake beneath the cockpit. Loaded weight of the V.G.90 is nearly 18,000 lb.

The flattened intake for the Nene turbojet in the Nord 2200 (below) is a characteristic feature of this naval prototype, the gross weight of which is reported to approach 16,000 lb.



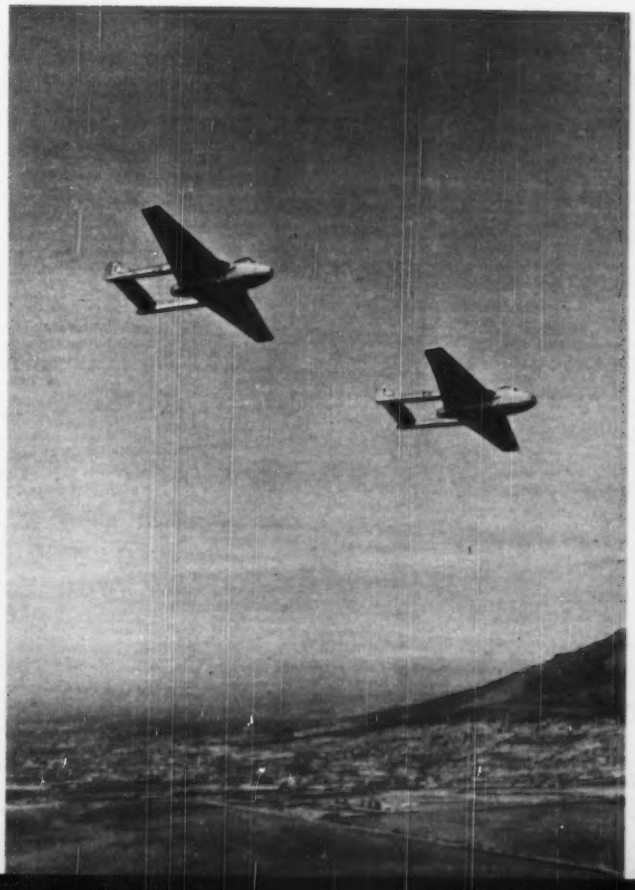
Below is the Nord 1601 research aircraft with two Derwents in nacelles flanking the fuselage. With its present power it is unlikely to exceed 625 m.p.h.



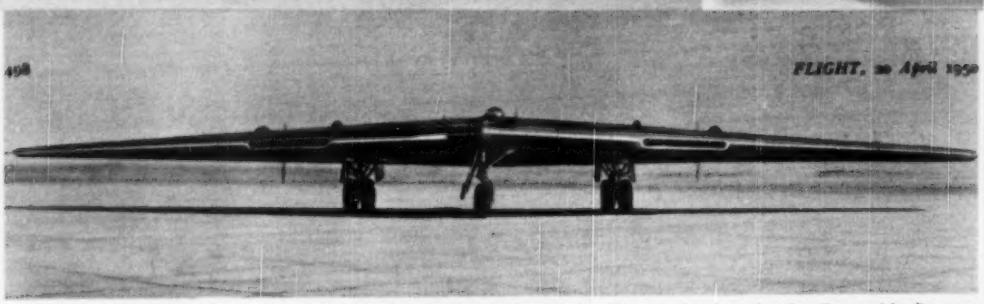
NEAR RELATIONS

Seen (above) in semi-silhouette is the prototype Venom, displaying the new extended tail-plane, and mainplane boundary layer fences visible at approximately semi-span.

Recent Views of de Havilland Jet Fighters Show New Features of the Ghost-powered Venom, now in Production for Fighter Command Squadrons, and Vampires Serving with the South African Air Force



The first batch of Vampire 5s for the South African Air Force have been assembled and flown at Ysterplaat airfield, Capetown, and two of these Goblin-powered fighter-bombers are seen over the fine harbour.



Kind to air particles: This head-on view of the Northrop YB-49 Jet-Wing bomber illustrates its clean, drag-free lines and landing-gear design. The YB-49 was an eight-jet conversion of the piston-engined B-35.

CHRONIC SONICS

Variations on a Theme by Mach—with Machiavellian Undertones—as Reflected in U.S. Bomber Design

By Stanley H. Evans, F.R.Ae.S., A.F.I.Ae.S.

Designed as a companion-piece to the same author's "Tonic Sonics," published in "Flight" of January 5th, in which he discussed the implications of current U.S. jet-fighter design, the present article shows how involved are the problems of bomber layout in relation to the various supersonic imponderables. The biggest riddle facing the designer is whether to "jump the transonic hurdle" by going direct to the delta wing rather than to devote further time to experiments with the arrow or the ecaudate plan-forms—configurations already reached in the fighter. Stanley H. Evans—an Englishman resident in the United States—regularly contributes his "American Notebook" to these pages.

A RECURRENT source of surprise to the British observer of the American political scene is the quasi-autocratic power vested in the executive arm of the American republican form of government. To the parliamentarian, it would almost seem as if the principle of the divine right of kingship—which in England once cost a king his head—had been transferred in America to the presidential office. The people vote and the Congress legislates, but the President still has considerable power of veto to hold up, or at least slow down, the legislative horses. With a little help from the Treasury, some of the horses can be put on short rations and locked in the stable for quite a while.

In the aeronautical firmament this executive power has been strikingly manifested during the past year in the baulking of the 70-group Air Force, the legislation for which was passed almost unanimously by both branches of Congress, presumably expressing the sovereign will of the people. Under executive ruling, however, the U.S.A.F. has been kept on a 48-group diet, perhaps in deference to a five-billion dollar deficit in the national exchequer. And so, in concert with an economy-conscious Executive, a year or so ago Defence Secretary Johnson scuttled the U.S. Navy's big carrier after the keel had actually been laid. Now comes news that the Air Force, reportedly for economy reasons, may drop the XB-52 super-bomber, Boeing's big-brother sequel to their own B-47. Confidently predicted as the long-range jet answer to the B-36, the XB-52 has been variously reported to gross anywhere between 400,000 and 500,000 lb, while the power potential was estimated on the basis of eight 10,000-lb turbojets strung out under the wing in much the same fashion as on the B-47.

American newspapers quote the following official statement:

> "As part of its continuous review of existing and planned programmes, the Air Force is examining, among other things, the plans for the B-52; however, no actual decision has yet been reached whether the B-52 will be dropped from its present position as the planned successor to the B-36. Studies are being made to determine the extent to which the B-36 may logically be expected to develop with changes in design and power."

In the latter connection, it is unofficially reported that the Air Force is considering replacing the B-36's six piston-engines with new turboprops, either Allison 5,500 h.p. XT-40s or the 5,000 h.p. Pratt and Whitney, in order to increase the speed and altitude. Another news puff now wafting on the breeze claims that the Air Force is modifying the B-36 wing into a swept-back design similar to that of the Boeing B-47.

At first blush, the idea of turbopropping the B-36 appears a logical development, especially in view of Convair's current design programme with the Convair-Liner and the Navy XP5Y-1 patrol boat. By replacing the existing 3,500 h.p. Wasp Majors with the 5,500 h.p. turboprops now available, a sizeable jump in performance might be expected. (One recent report makes the bold claim of 500 m.p.h. at 50,000ft!) A second look, however, at the power available upstairs in the stratospheric belt—which is of the only zone of interest in strategic bomber design—may melt some of the gilt off the gingerbread, since the highly supercharged model of the Wasp Major R-4360-41 developed for the B-36 may actually give more, or at least as much, power at 35-40,000ft as the Allison XT-40 or its P. and W. competitor. While the turboprop might conceivably score by virtue of its higher cruising power ratio under optimum-range conditions, the overall gain *vis-à-vis* the highly supercharged piston engine is considerably lower than appears at first sight. A closer study might even show the Wasp Major to be superior at combat altitudes.

The swept-wing proposal is even more difficult to diagnose, since the piston-cum-jet B-36D is reported to have a top speed at altitude, with jets operative, of only 435 m.p.h. Because of the thick wing-section, tapering from 22 per cent at the root to 17 per cent at the tip, the critical Mach limitation is low—approximately 0.70 or, roughly, 460 m.p.h. at 35-40,000ft. If, then, the turboprop power at altitude is little better (or even inferior) to that of the Wasp Major, the critical M is unlikely to be exceeded—in which case, the necessity for increased sweepback appears obscure. It is just possible that it may arise from the static balance change occasioned by the substitution of a tractor-propelled power-plant for the existing pusher installation.

Still another report—and this one seems to rate more credence—says that the B-36F edition of the Big Stick will be powered with the new Pratt and Whitney R-4360-53 piston-cum-turbo compound engine. This is the latest version of the VDT (variable-discharge-turbine) installation, reported to deliver a maximum of over 4,000 h.p. (Earlier reports quoted 3,880 h.p. at 30,000ft, with a corresponding top speed of approximately 420 m.p.h.—albeit without

THE SUPERMARINE 510, developed from the "Attacker," has swept-back wings and tail unit to delay the onset of compressibility effects. The superb finish on all surfaces ensures a high aerodynamic efficiency which makes full use of the thrust of the Rolls-Royce Nene Engine.

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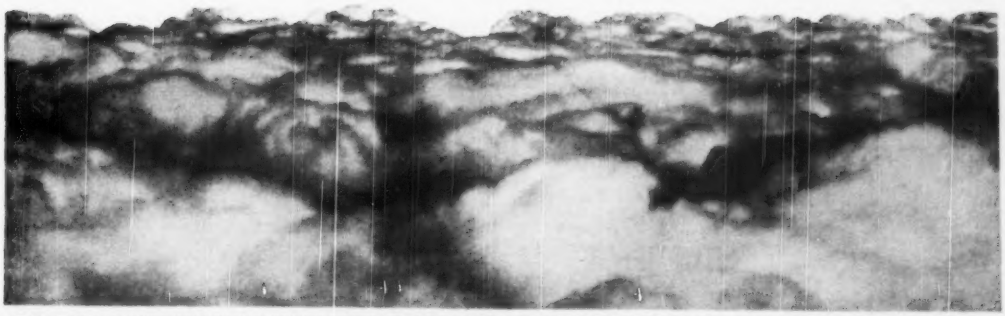

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BRITAIN'S
MECHANICAL HANDLING
EXHIBITION

The 1950 Mechanical Handling Exhibition at Olympia, London (Grand and National Halls) will provide a practical answer to the world-wide demand for mechanical aids in the battle for greater output and lower costs of production. Covering a total floor area of more than 200,000 square feet, it will be the world's largest exhibition of its kind.

The diversity of exhibits will include :—

CONVEYORS	STACKERS
ELEVATORS AND RUNWAYS	HOISTS AND PULLEY BLOCKS
CRANES *(Fixed and Mobile)*	PNEUMATIC HANDLING PLANTS
AERIAL ROPEWAYS	SACK AND BAGGING MACHINES
INDUSTRIAL POWER TRUCKS	SCREENING AND WASHING PLANTS
DUMPERS AND MECHANICAL SHOVELS	CONVEYOR BELTS, GEARS, MOTORS AND ACCESSORIES OF ALL KINDS
COAL, COKE AND ASH HANDLING PLANTS	
FORK LIFT TRUCKS	

The Exhibition will embrace all forms of bulk and package handling, and many of the exhibits have never before been on view at any exhibition.

The very wide range of equipment in operation will demonstrate the potential increase in production resulting from the adoption of mechanical handling methods.

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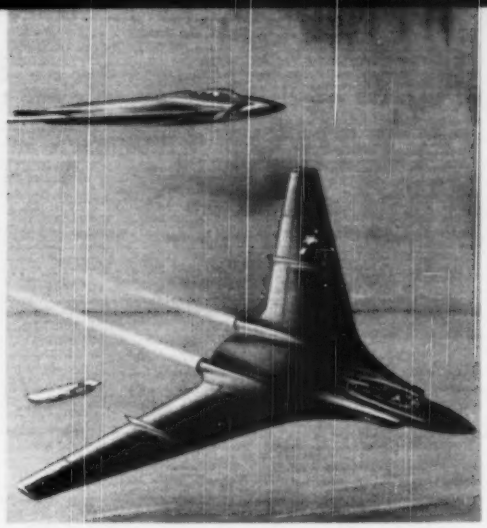
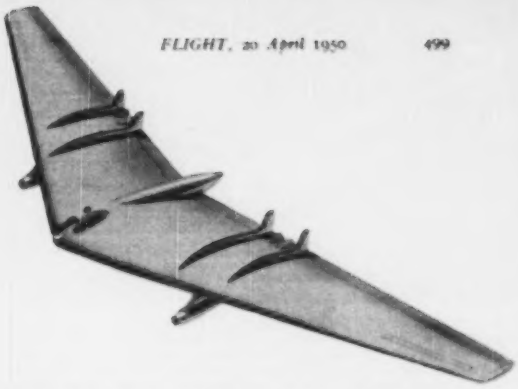




Northrop YB-35B : A proposed jet conversion with six later-model Allison J-35-19 (5,000-lb s.t.) turbojets, four inside the wind and two outside in pods. (Left) A mythical Northrop carrier-based patrol bomber with twin turbojets and a crew of three.

benefit of the subsequent J-47 jet boosting.) Considered purely from the standpoint of range, the compound unit is clearly superior to all the rest, since on paper at any rate it could extend the maximum range by some 20-25 per cent, stretching the total to something like 12-13,000 statute miles. Nevertheless, we cannot help feeling that this kind of belt-straining for the long-distance jump is a misdirected effort, because the basic combat weakness remains the slow cruising speed of 300 m.p.h., a factor which is inherent in the cruising attitude of the B-36 airframe and its relationship to the characteristic fuel-consumption curve of the piston engine.

Should the compound-engined B-36 also retain the jet pods, the critical Mach Number of 0.70 for the existing airframe would almost certainly be exceeded, since with the jets operative there would be enough power potential to reach, or closely approach, a top speed of 500 m.p.h. at the 35-40,000ft level (M = 0.75). With this possibility in view, the need for increased wing obliquity now becomes apparent and may account for the Machian rumours in the air. The retention or retirement of the jet pods will probably depend on the success (or otherwise) of the parasite fighter scheme mentioned in our "American Notebook" on March 23rd. Concerning which, one's imagination rather boggles at the thought of a pair of returning jet fighters dodging both slipstream and poddery while seeking "lebensraum" at the wing tips.

STORM SIGNALS

To return to the situation on the Seattle Front, Boeing are known to have a contract for two prototype XB-52s, which probably means that the design is still in the mock-up, wind-tunnel-model and drawing-board stage, with actual production still some way off. In view of the present fluid nature of the jet-propulsion art, especially in the transonic zone of bomber design, it is questionable whether an enlargement of the B-47 configuration would be a sound investment for the future. Looking at the time scale only as far as 1955, it would seem a better gamble to stretch the imagineering a bit further by investing money and man-hours in a supersonic bomber design based on a more advanced wing configuration; that is, if the jet bomber is intended to keep abreast, or possibly ahead, of its fighter contemporary.

Aside from technical considerations—where, admittedly, one technician's meat is the other fellow's poison—the dollar aspect has been aired by Wm. M. Allen, Boeing president, who said recently that an investment in new equipment costing several million dollars would be necessary (and justified) should the Air Force decide on quantity production of the B-52 at the Seattle division of the company. Plans would also have to be put in hand for a 2,000ft extension to Boeing Field at Seattle, since the B-52 is estimated to require a runway of at least 9,000ft. A sidelight on this may be seen in connection with the flight-test programme of the B-47 at Boeing's Wichita division, where one of the runways at the Municipal Airport is being lengthened from 7,100 to 10,000ft.

This latter fact may provide a possible clue to future Air Force bomber procurement policy, for there is a widespread feeling in aero-political circles that the military side, if not the commercial activities, of Boeing's Seattle plant is eventually destined for removal to Wichita. Despite the usual tongue-in-cheek protestations of innocence from Washington, it is no secret that the military planners of the Pentagon are perturbed about the vulnerability of Seattle to air attack. Quite recently, in fact, the Air Force has set in motion the bolstering of the Pacific North-west Defence Area, which by some strange quirk of defence planning happens to include the Hanford (Wash.) atomic plant. The Army has also deployed additional anti-aircraft units in this area.

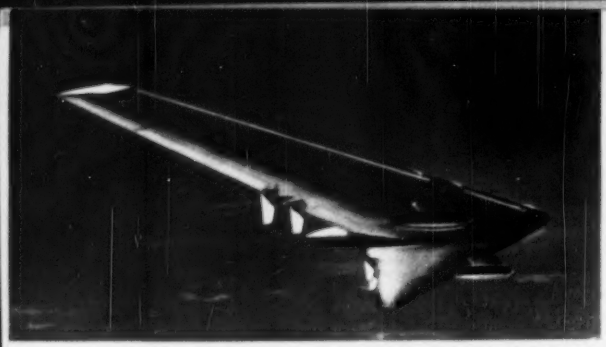
One senses a sombre shadow behind the storm cone, for the atomic time-clock, hitherto hidden under the lid of Pandora's Box, has ticked away much faster than was so naïvely predicted by the military planners. Now that the Russians have succeeded in prising up the lid, the military situation has changed almost overnight, as a look at the polar map will quickly show. Many of the biggest industrial cities of North America will soon be within uncomfortable bombing distance from Russian bases in Siberia. It is a sobering thought to reflect that command of the third dimension may shift the major strategic emphasis from the cockpit of Europe to the bearpit of the Arctic.

JET-WING JINX

A persistent run of sheer bad luck continues to bedevil the fortunes of Northrop and to mar, in particular, the future of the all-wing principle. Following closely on the loss of the XF-89 Scorpion all-weather fighter while being demonstrated to Air Force officialdom a month or so ago, the U.S.A.F. has now lost its last remaining operational jet-wing bomber, the second YB-49, which crashed and burned during a high-speed taxi run at Muroc on March 15th. Fortunately, the crew of six, all members of Wright Field's flight-test division, escaped (with minor injuries) before the fire broke out. It will be recalled that the first YB-49 was destroyed in the air over Muroc last year.

According to official spokesmen at Muroc, the YB-49 had successfully completed a series of stability and control tests and was rolling fast along the hard ground at the end of the dry lake bed when the nosewheel developed shimmy trouble, apparently from a tyre blow-out; the nose leg then collapsed and the aircraft dug its nose in and ploughed up the ground for some distance. The accompanying illustration shows that the nose landing gear comprises a single-wheel system, a design feature known to be somewhat prone to unstable oscillation under certain conditions.

Air Force policy regarding procurement of the Big Wing has been no less oscillatory, like petals blown on the breeze: "This year, next year, now, never." Some eighteen



Northrop YRB-49A: Externally similar to the cancelled YB-35B, this six-jet conversion is nearing completion; it will be the sole survivor of the all-wing jet-bomber project. Powered with six Allison J-35-19 (5,000-lb) turbojets (four inside and two outside the wing) it will be a photo-reconnaissance version.

CHRONIC SONICS . . .

months ago, Northrop had what looked like a firm contract for 30 B-49s, with roseate prospects of a big production order running into several hundreds—which, no doubt, was the first seed sown by Congress towards the 70-group rearmament programme. Unhappily for some members of the aircraft industry, much of that early seed has fallen on the stony ground of economic retrenchment. In the case of Northrop, perhaps it might be fairer to say that the germinative process is being choked in the weed-patch of the wasteland that divides the piston-engined era from that of the jet. With this, then, as a working hypothesis, a quick look-back over the landscape is in order, to show the progress made and the general direction in which Northrop is heading; it may also possibly mark some of the detours along the way.

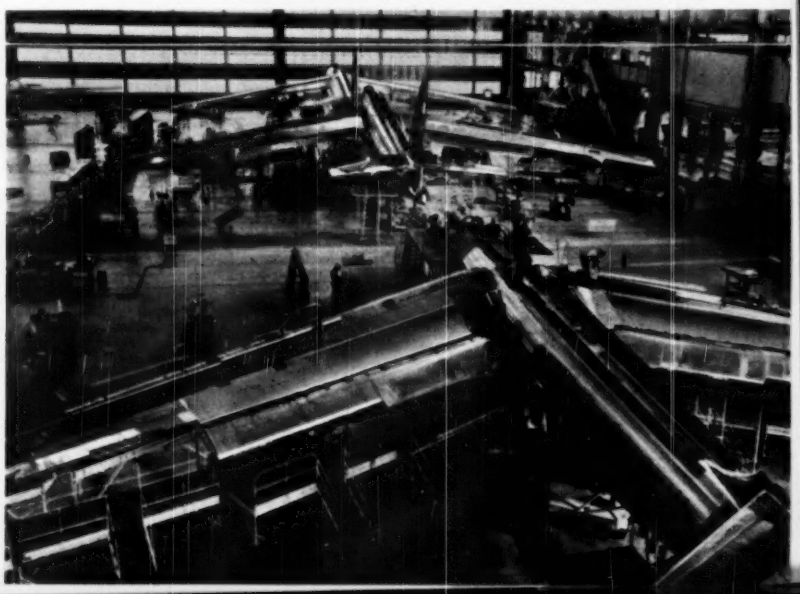
Originating as far back as 1941 or 1942 in competition with the B-36, the Northrop B-35 Flying Wing has had rather a chequered history, with more than the usual share of development bugs on the power-plant side to confuse and bemuse the structural and aerodynamic issues. Looking at the asymmetric positioning of the pusher airscrews in relation to the wing trailing edge, one might suspect this sort of geometry to have been a contributory factor in the malfunctioning of the airscrew-drive-system, but Northrop believe that most of the troubles can be traced to faulty propeller design. Be that as it may, when the jet engine appeared on the American scene, the company was quick to size up its obvious potentialities when harnessed to the all-wing airframe; and out of the original contract for 15 piston-engined B-35s, two were converted into jet-wing YB-49s powered with eight Allison J-35 4,000-lb turbojets while still in the embryo airframe stage. These are the two casualties referred to previously.

Purely from the aspect of aerodynamic cleanliness, the jet conversion had all the airmarks of an eminently successful job, with the two banks of four-jet units submerged neatly within the wing envelope on either side of mid-section bomb-bays. This arrangement, together with the reduction of crew and armament rendered feasible by the big jump in performance, provided additional volume within the wing for increased jet tankage. Indicative of current range performance was a cross-country flight last year of nearly 3,500 miles. Theoretically, at least, the YB-49 wing envelope appears capable of housing sufficient fuel for a maximum range of 5,000 miles in combination with a bomb load of 30,000 lb. If the bomb load is reduced to 10,000 lb and additional fuel carried in the bomb-bay, the maximum range could be stretched to 6,000 miles. These theoretical predictions, it might be stated, are postulated on a cruising specific fuel consumption of 1.0 lb/hr/lb at stratospheric altitudes.

Of the remaining 13 aircraft, three were completed and extensively flight-tested in their original YB-35A pusher-propped condition and, in spite of the somewhat temperamental power-plant performance, they have yielded valuable data on the stability and control of the ecaudate wing configuration. We understand that one of these YB-35A airscrew-driven Flying Wings is being maintained more or less in the original condition for further test purposes, possibly for installation with later versions of the P. and W. Wasp Major such as the VDT model. The other ten aircraft were slated for jet conversion (nine flight and one static test) as YB-49As, similar to the first pair which have since been destroyed.

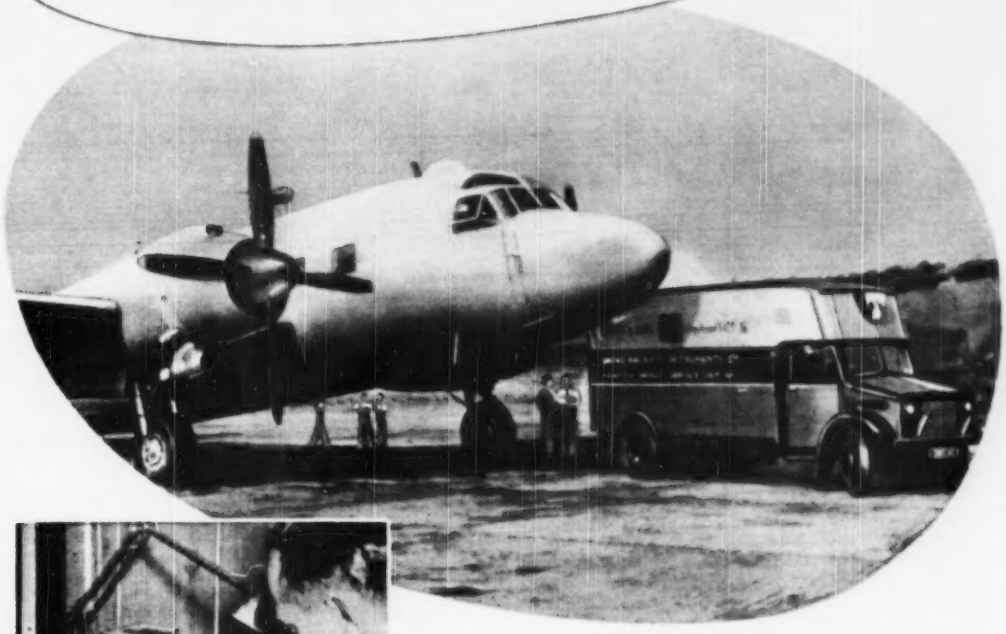
Later, however, Northrop announced a new conversion programme with some interesting variations on the original theme. Eight of the jet conversions were to be redressed with six Allison J-35-19 5,000-lb turbojets in place of the eight earlier-model 4,000-lb units—that is, a total static thrust of 30,000 lb in lieu of 32,000 lb. Surprisingly enough—for Northrop—four of the jet units were snugly buried inside the wing, but the other two were now suspended Boeing-wise, under it, as illustrated on page 499. The reason for this Northrop heterodoxy is not immediately obvious, although a first thought suggests a static-balance compromise, plus the further possibility of squeezing more tankage volume out of the wing. The six-jet theme, for example, ought to save at least 5,000 lb of power-plant weight, which is equivalent to a dividend of some 800 gallons of U.S. jet fuel.

Six out of the eight jet-conversions, designated as YB-35Bs, were intended for non-tactical purposes in advanced exploration of the all-wing principle. (A great deal of comment has been rife concerning its steadiness as a bombing platform.) The seventh was classified as the YRB-49A, indicating a long-range photo-reconnaissance version rather than a medium-range bomber. Theoretically, again, if the



"Remachable" transonics: Boeing B-47A medium-range Stratojets are now coming off the production line at Wichita, first of a batch of 75. The B-47 is an ingenious structural interpretation of the Mach theme in its application to the thin, flexible, swept-back wing.

SMITHS Service Engineers



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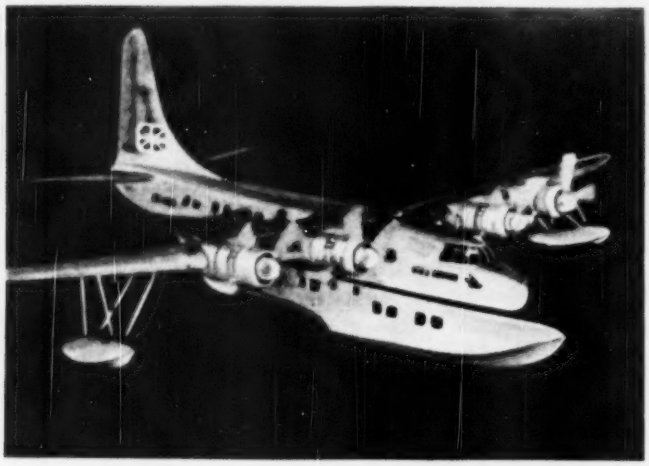

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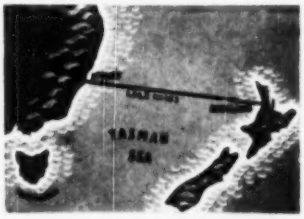
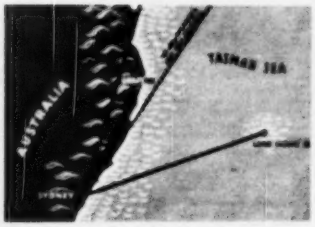


Thousands of passengers a month

Each day, with clockwork regularity, Short flying boats of Tasman Empire Airways cross the Tasman Sea both ways and reduce the 1,342-mile journey between Sydney and Auckland to a matter of a little over six hours. With the luxurious accommodation of the new 40-seater Short Solents which they are now operating, and in which T.E.A.L. have stepped up passenger capacity to 1,080 a week, passengers have often stated that this journey is all too short.

In 1949 T.E.A.L., who have operated Short aircraft exclusively over this route for ten profitable years, carried the record number of 10,915 passengers and 289,483 lbs. of freight and mail.



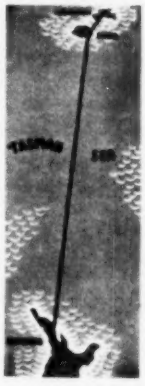
T.O.A. Sandringham's record load

Trans-Oceanic Airways operate Short Sandringhams on their various schedules to Lord Howe Island, the Solomon Islands, the New Hebrides and New Caledonia, and by arrangement with the State of New South Wales there is a twice-weekly return service from Sydney to Grafton, N.S.W.

Recently a T.O.A. Sandringham landed on the Clarence River, Grafton, with 33 passengers and 8,500 lbs. of mail—the greatest weight of airmail ever lifted by one aircraft in Australia.

Short Sunderlands on N.Z.N.A.C. Fiji Service

New Zealand National Airways, using the famous Short Sunderlands, are carrying travellers between Auckland, New Zealand, and Lambasa, on Vanua Levi, in the Fiji Islands.



First stop on this route is Suva, where passengers make connections for the U.S.A. On this route alone N.Z.N.A.C. report that in 1949 more than 3,000,000 passenger-miles were flown by these renowned aircraft.

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bomb-load is entirely replaced by fuel, a maximum range of 7,000 miles appears feasible. In terms of practical operating radius this would amount to about 2,500 miles.

TURBOPROPPED FLYING WING

Most unusual of the jet conversions was to have been the eighth, designated the EB-35B and planned as a flying test-bed for the Turbodyne XT-37 turboprop. (This announcement presumably indicated that the XT-37 had passed the official ground-tests and was ready for flight trials.) The EB-35B was also laid out on the six-jet theme, but in addition thereto it incorporated the test Turbodyne unit offset to the left of the aircraft centre-line by some 12 or 13ft. Another interesting feature was the proposal to discharge the jet constituent of the thrust through the hubs of the large dual-rotation pusher props, the latter being designed to absorb some 10,000 s.h.p. It was intended to take-off and land with the six turbojets, then, once the aircraft was airborne, the jets would be throttled back and flight maintained on the turboprop combination.

In the light of Air Force bomber policy, the Northrop design philosophy is understandable. The top planners of the Pentagon have long been sold (over-sold, we think) on the 10,000-mile strategic Big Stick for delivering the A-bomb; and, with the B-36 in favour, it is natural enough that Northrop designers should attempt a rival bid in the long-range airscrew-driven sphere with their own turboprop baby. We believe that it was eventually intended to use a pair of 10,000 s.h.p. Turbodynes as the principal source of power for adaptation to the existing airframe, with the further possibility of turbojet boosting on the lines of the B-36D. This, incidentally, may partially explain the present Northrop fall from grace in joining the poddists.

On technical grounds, Northrop engineers can put up a very strong case for the turbopropped all-wing combination designed for ranges as great as 12,000 miles and cruising speeds as high as 450 m.p.h., with a maximum of 550 m.p.h. Not so long ago, in fact, Jack Northrop personally told this observer of his firm conviction that: "In the extremely long-range category, the turboprop comes nearer to combining the speed of the jet with the range of the reciprocating engine than any other power-plant and, theoretically at least, a turbopropped Flying Wing has adequate range and operating speed as well as high speed equal to, if not better, than its turbojetted sister." He qualified this thesis, however, by adding: "Of course, the B-49 incorporates outmoded wing-thickness ratios and insufficient sweepback for operation at very high Mach Numbers operation, so the advantages outlined disappear rapidly as speeds increase."

Actually, the decision cannot be adjudged on technical grounds alone, for it is inextricably bound up with the military time-scale as well as a technical one. It depends in large measure upon which part of the speed-altitude spectrum the bomber strategists expect to operate in—which, in effect, boils down to sizing up the status of contemporary fighter performance at the time the hypothetical turbopropped bomber reaches the operational stage, probably 1955 at the earliest. In the face of the rapid advance of jet-cum-rocket interceptor design—and keeping clearly in mind the relative development times of bomber and fighter—the question that must be asked and answered is: "Can the military planners count on fighting the next war at 450 m.p.h. (or even 500 m.p.h.) just because this band of the performance spectrum happens to coincide with the long-range economics of the turboprop?" Personally, we think not—the jet writing in the sky is all too evident.

Although it can hardly fit into the developing pattern of the stratospheric transonic bomber now clearly in sight, the turboprop does have a very definite place in the military armoury. Where it *does* happen to have the field wide open is in the sphere of naval air operations, one specific example that comes to mind being the long-range, low-altitude patrol bomber such as the Convair XP5Y-1 boat. Again, from a logistic standpoint, naval planners do not take kindly to the prospect of having to carry aboard aircraft carriers large fuel supplies for thirsty jet bombers.

Oddly enough, despite all these well-known naval arguments in favour of the turboprop, Northrop engineers have conceived a carrier-based patrol bomber designed around a turbojetted all-wing combination, as shown in the accompanying sketch. Assuming that the naval patrol bomber is essentially a low-level sentinel, this is plainly one specification where the jet would be trespassing way inside the economic domain of the airscrew. The oddness of this thinking—as we see it—is that here one might more logically have expected Northrop to push their own Turbodyne.

MACH ANGLES

But on the Air Force side, the jet trend of future bomber design is confirmed by the high priority accorded to the Boeing B-47, the first production units of which are now coming through at Wichita as part of a batch of 75. Because, however, the B-47 is not yet a long-range bomber, the Air Force strategists are gambling on the B-36 to play that role, preferring range backed up by heavy defensive armament instead of speed. It looks, indeed, as if the B-36 is being patched up as a kind of short-term insurance policy until such time as the B-47 reaches long-range maturity. Currently, our slide-rule shows that the B-47 is good for about 6,000 miles at a *cruising* speed of 570-580 m.p.h., and an initial gross weight around 155,000 lb, carrying a bomb-load of 20,000 lb.

With this kind of competition, and with Defence Secretary Johnson avowedly out to pare the waste fat off the military budget, it is not surprising that the Flying Wing bomber programme has suffered under the carving-knife. The trouble, as we hinted earlier, is that the present B-49 airframe was born in the pre-Machian age of the thick wing, hence a potentially fruitful seedling has been fated to wither upon the barren soil of what has become a kind of "no man's land" between the piston and the jet. The B-47, on the contrary, is a post-war Machian conception wedded to the jet right from the pencil-project stage.

Technically, then, the fault lies not in the tailless configuration *per se*, but primarily in the outmoded wing thickness of 20 per cent at the root, precisely as Northrop himself so clearly sees and as candidly admits. It is regrettable from a forward-looking engineering viewpoint that Messrs. Mach and Machiavelli should have teamed up together, because it obscures the real issue, which rests on the postulate that the ecaudate wing principle is the logical approach to the delta—as Northrop again so ably demonstrated in his classic Wilbur Wright Memorial Lecture ("The Development of All-wing Aircraft," R.Ae.S., 1947).

Anyway, the upshot of all this manœuvring on the Pentagon chequer-board was a recent directive bringing the Flying Wing bomber project almost to a standstill. Northrop were instructed to wash out the six YB-35B jet conversions along with the EB-35B Turbodyne-engined flight test bed. Development of the Turbodyne itself also seems to be hanging fire at the moment. This leaves only one out of the eight jet conversions, the YRB-49A long-range photo-reconnaissance version (illustrated on page 500), which is nearing completion and should be flying in a month or so. At least this will permit further evaluation of the stability, control and range possibilities of the jetted all-wing design up to Mach 0.75, the probable limit of the airframe.

The evolutionary vicissitudes of the B-49 from the B-35 provide a very good illustration of the changes fashioned in bomber design by the advent of the turbojet, for they emphasize how skilfully the rest of the design ingredients must be mixed to conform with the Machian recipe. Just what constitutes a successful mixture is still the subject of learned debate and mystic symbolism among the aerodynamic chefs. But since no one can yet say with dogmatic certainty whether the *chef d'oeuvre* will turn out to be an arrow-winged stick or a trapezoidal tea-tray (or even the saucers associated with the tray), it is obviously sound policy to scout along both sides of the road ahead. For that reason, full-scale development of the ecaudate wing configuration with greater sweep angles and much thinner wing sections is likely to continue, in spite of temporary setbacks.

BERGER BX-100

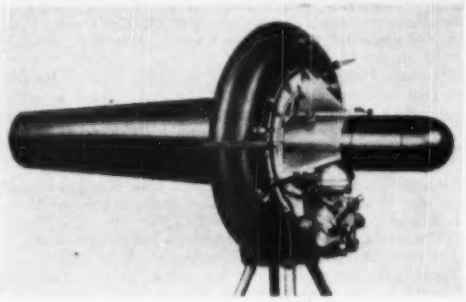
A Swiss Small Turbojet for Light Aircraft

DEVELOPED by a Swiss engineer, Hans Berger, of Gstaad, this jet unit has a number of unusual constructional features. A centrifugal compressor rotor and a centripetal turbine rotor are mounted closely adjacent on a common shaft and overhung from bearings arranged on the intake side of the compressor casing. The bearing housing, located in the incoming air stream, incorporates the simple bath and oil reservoir which constitutes the lubrication system. Neither oil pump nor cooler is fitted. Axial thrusts of compressor and turbine rotors are substantially balanced.

Three combustion chambers of helical configuration are arranged around the periphery of the rotor casing. Fuel is delivered to the sprayers at a pressure of about 1,000 lb/sq in by a duplex pump mounted below the bearing housing and actuated by low-lift eccentric cams on the rotor shaft. One pump unit is adequate to maintain operation and each is furnished with a pressure gauge to indicate its functioning. A single-lever control unit on the pump regulates the amount of fuel delivered to the chambers from zero to maximum.

The electric starter motor is flange-mounted to the front of the bearing housing and drives directly on to the end of the main rotor shaft through an overrunning coupling. Actuation of the starter switch also supplies current to the igniter plugs and regulates the fuel delivery. Initially a start is made on benzine, but after running at idling speed for about one minute to attain operating temperature the supply is changed over to petrol or diesel oil. Acceleration from idling to maximum speed of rotation takes from 4 to 5 seconds.

It will have been noted that no toothed gears are used in this construction. Even the revolution counter is an electrical device actuated by a cam on the rotor shaft and an interrupter in order to eliminate the usual gear drive and flexible shaft. As regards performance, the unit is claimed to produce a thrust of 370lb at a rotational speed of 30,000 r.p.m. with a specific fuel consumption of 1.38 lb/lb/hr. Overall dimensions are 19in diameter and 31.5in long, and weight is 97lb.



This Berger turbojet, developing 370 lb thrust, was first exhibited at the Geneva Automobile Show in March.

Hans Berger, the inventor, gives scale to the unit. Weighing only 97 lb, it is 19in diameter and 31½in long overall.

TWO RECENT BOOKS

"I Flew with the Birds," by Harald Penrose. Country Life, Ltd., Southampton Street, London, W.C.2. Price 18s.

WHETHER you know Harald Penrose best as a test pilot, an ornithologist, or as a lover of English country life, you will not be disappointed in this book. It contains something of each, transformed into a magnificent book of the air by the skill of Penrose the author.

I Flew with the Birds is a book about England in the rich tradition of Rupert Brooke, full of "her sights and sounds, dreams happy as her day . . . and gentleness." Brooke's "English heaven" is portrayed not as a mere sea of vaporous emptiness, but as a world peopled with "carefree creatures, living intensely for the moment, applying an intelligence as discriminating as ours to factors affecting their lives, possessing a freedom which knows no barriers but the wearying of their wings."

Typical of Penrose's vivid, fascinating style is this story of a flight by Rapide in early March:—

"As the sea vanished beneath the wings and fell astern, the turbulent little hills of South Dorset appeared, their cataclysmic creation disguised by a coat of quiet turf. Placid farms nestled between folds of smooth downland, little hamlets in tranquil valleys, and on the hill-tops were the faint pit-circles of anciently dead men. I turned from the shadowed indentations of the downs, scanning ten miles of countryside with no more than a casual glance, and saw a score of other intimate features that delineate the Dorset picture: the bright water of lost rivulets, glittering ice, the purple sheen of tree-tops new with bud, ragged little fields, wandering lanes—and yet all these were subservient to the high-ridged downland spanning far across the country like the frosted russet-brown back of a vast monster. And everywhere glimpses of birds flying: gulls making a passage, rooks soaring high above the windward side of elms, grey pigeons clouding above copses, and a few groups of speeding starlings."

We can join the author as he frolics with gulls as spritely as his Seafire, and while he flies an Autogiro in leisurely company with the lapwings. With him we can study the aerodynamics of a gull's wheeling flight, learn how nature evolved slots and air brakes long before man conquered the air. The more we read, the more obvious it becomes how much we still have to learn.

This is not just a book for the bird lover or the aviation enthusiast; it is a book for everyone who can find adventure or freedom in flight, and for anyone who can enjoy good prose. The greatest compliment that can be paid to the illustrations by Charles Brown, John Barlee, John Yoxall of *Flight* and others is that they fully maintain the high standard of Penrose's text.

"The World's Airways and How They Work." Odhams Press, Ltd., Long Acre, London, W.C.2. Price 8s 6d (standard edition) and 9s 6d (de luxe edition).

IT is easy to be critical of a work of this nature, whose editors have tried to pack a vast amount of information on a complex and technical subject into a single book intended for the average layman. In this case, however, the result is not only successful but quite attractive. The reason is obvious when one reads through the list of notable contributors on the contents page.

Inevitably, some of the information is, or will soon be, out of date. Indeed, one wishes that this were not so in the case of the fine series of photographs illustrating B.O.A.C.'s Solent flying-boat service to South Africa. But, on the whole, *The World's Airways* is a good introduction to the subject for the general public, who have to pay for most of the expensive equipment described and illustrated in its 320 pages.

CIVIL AVIATION NEWS

WHEN IN ROME.... The turboprop Vickers Viscount at Ciampino Airport, where, following the visit of the pure-jet Comet, it caused great interest and speculation in Italian civil aviation circles.

B.E.A.'S EASTER "EGG"

IN the April issue of the *B.E.A. Magazine*, Mr. Peter Masefield, the chief executive, congratulates the Corporation's staff on its enthusiasm and excellent morale. Explaining that one phase of B.E.A.'s forward progress is now over, Mr. Masefield considers that, although there still remains the need to improve efficiency, the Corporation seems to be "pretty well streamlined to meet the task ahead."

His views are supported by the news that B.E.A. enjoyed a record traffic period at Easter, when, during the week-end, no fewer than 125 Viking services were flown from Northolt to Paris alone, as compared with 66 services in the corresponding period last year. During the holiday, Lord Pakenham paid a visit to Northolt, where, with Lord and Lady Douglas of Kirtleside, he met several members of the staff.

B.E.A. has so far made excellent progress towards eliminating its operational deficit, and, given the opportunity to operate transport services which are economically worth-while, should soon become a profitable airline.

DISPOSAL OF B.O.A.C. AIRCRAFT

SEVERAL types of aircraft surplus to B.O.A.C. requirements are to be disposed of or have already been sold. The fleet of eleven Plymouth flying-boats, with spares, together with five Liberators, have been sold to an American firm of aviation brokers, and it is understood that part of the purchase price was paid in U.S. dollars. For the time being the destination of all these aircraft is being kept secret. Of five Tudor Vs for sale, three have been purchased by William Dempster, and it is believed that they will later be operated in Africa. The other two are the subject of negotiations at the present time.

DO AS THE ROMANS DO: Sir Hew Kilner (Vickers-Armstrongs, Ltd.) and Sir Victor Mallet (British Ambassador) share smiles with the Defence Under-Secretary, Sen. Malintoppi (left) and Gen le Ajmone-Cat (right).

I.A.T.A. TECHNICAL CONFERENCE

THE fourth Technical Conference to be held by I.A.T.A. will take place in New Jersey from May 9th to 20th. More than 150 representatives of member airlines will participate in what is said to be the first meeting of its kind to be held in the United States. The agenda will include the discussion of outstanding problems and the latest developments in communications systems, radio aids, engineering and maintenance, and operations and meteorology. Maintenance and operating methods envisaged for jet transports are also being discussed, together with policy on approach lighting, which is to be reviewed in detail.

In connection with the conference there will be demonstration flights between New York and Washington, where traffic density is probably the highest in the world, and a three-day display of all types of airborne radio and radar equipment. The chairman is to be Mr. Carl C. Steensma of K.L.M.

CORPORATION "COMMUNISM" ALLEGATION

AT a recent meeting of the Aeronautical Engineers' Association a complaint was received from employees of B.O.A.C. that the recognized trade-union organizations in nationalized aviation were "riddled with prominent Communists."

In view of the recent allegations of sabotage in a B.E.A. Viking the committee has decided to send a resolution to the Minister of Civil Aviation, requesting a public enquiry into the activities of a number of Communists who are said to be holding responsible positions on the trade union side of the National Joint Council.

It is alleged that, since 1946, many of the principal trade union officials at Corporation airfields have been Communists.

AMERICAN AIRLINES IN 1949

LAST year's operating and financial results should give American Airlines considerable cause for satisfaction. Revenues for the year showed substantial increases, and although practically all the world's operators experienced rising costs last year, this particular company's expenses increased by less than 3 per cent. The total revenues amounted to $103,206,000, and the net profit was $6,511,237, after the company provided the sum of $1,800,000 for Federal income taxes.

Passenger traffic was 16 per cent higher than in 1948, and the volume of freight carried increased by 42 per cent. Some of the unit costs achieved reflect much-improved operating efficiency. Operating cost per revenue ton-mile was decreased from 54 to 46.7 per cent during the year, and the break-even

CIVIL AVIATION NEWS . .

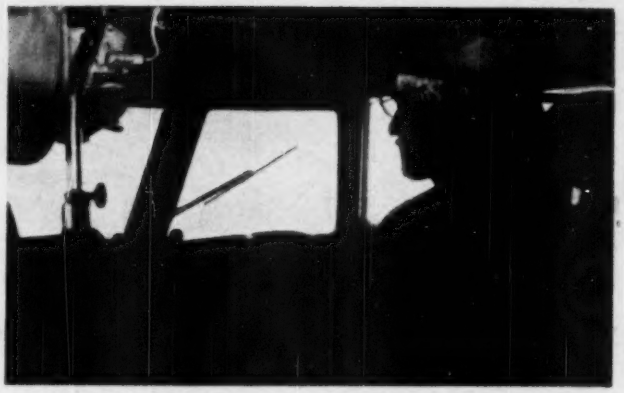
passenger load factor fell from 61.8 to 57.7 per cent. The actual passenger load-factor showed an improvement of more than 4 per cent. The number of revenue ton-miles flown per employee rose from 14,097 to 17,742.

Although final figures for the principal American carriers for 1949 are not yet available, comparative results for the first nine months of the year indicate that A.A. achieved the lowest operating costs.

During the year all DC-3s and DC-4s were withdrawn from passenger services, and the company's present passenger fleet is composed of long-range DC-6s; Convairliners are used for short-haul work. Orders have been placed for a further eleven DC-6Bs, delivery of which will be completed in the early summer.

LUXURY PLUS!

ON April 6th Air France introduced what is probably the world's most luxurious air service. A lavishly appointed Constellation named *The Parisian* now leaves Orly for New York every Thursday, returning to Paris on Fridays. The cabin is fitted with 34 couches, which can be extended full length for sleeping, instead of the normal 46 Pullman armchairs. Although it costs £9 more to travel in this opulent fashion, the price includes a 7-course champagne dinner, which, together with the interior colour scheme carried out by a noted Parisian decorator in "desert sand, terracotta and gold," will undoubtedly assist Air France in its bid for what the company terms "the cream of the millionaire traffic between New York and Europe."



AIRBORNE, NOT CHAIRBORNE: The latter epithet could never be applied to Air Marshal Sir Alec Coryton, Controller of Supplies (Air), M.o.S., who takes a personal and practical interest in new aircraft. He is here seen at the controls of the turboprop-powered (Bristol Theseus) Hermes V on a recent test-flight.

U.K. AIRPORTS IN JANUARY

PASSENGER and freight traffic at London and Northolt airports in January of this year was nearly one third higher than in the corresponding month of 1949. Northolt handled 36,000 passengers and 448 tons of freight, while London Airport accounted for 23,000 passengers and 687 tons of freight. A further 2,000 transit passengers passed through these two airports. The total of terminal passengers reported for all U.K. airfields (103,000) represented an increase of 20,000 on last year's figure.

Glasgow and Belfast each handled over 6,000 passengers. Ringway Airport (Manchester), with 136 tons, was third in order of importance for freight traffic. The total freight on- and off-loaded at all airports amounted to over 1,700 tons.

Airfield	Aircraft Movements			Passengers (terminal and transit)	Freight (tons)
	Air Transport	Other Flights	Total		
Aberdeen (Dyce)	155	543	698	1,163	8.8
Belfast (Nutts Corner)	422	50	472	6,124	72.1
Birmingham (Elmdon)	151	290	441	905	9.6
Blackbushe	106	1,420	1,526	1,660	23.7
Blackpool (Squires Gate)	190	449	639	545	9.9
Bovingdon	95	915	1,010	1,137	62.2
Bristol (Whitchurch)	3	993	996	8	—
Cardiff (Pengam Moors)	30	1,542	1,572	63	0.5
Croydon	136	366	502	106	48.1
Edinburgh (Turnhouse)	192	926	1,118	1,285	1.2
Gatwick	47	101	148	180	2.0
Glasgow (Renfrew)	741	255	996	6,393	28.0
Hurn	19	1,934	1,953	139	2.0
Isle of Man (Ronaldsway)	442	87	529	2,651	19.3
Inverness (Dalcross)	144	20	164	549	1.6
Kirkwall	235	20	255	1,308	6.9
Leeds (Yeadon)	20	350	370	31	—
Liverpool (Speke)	400	460	860	3,883	75.6
London	1,496	361	1,857	23,273	686.7
Lympne	33	256	289	59	25.2
Manchester (Ringway)	592	492	1,084	3,969	135.9
Northolt	2,672	754	3,426	35,924	447.8
Nottingham (Tollerton)	1	388	389	2	—
Prestwick	434	293	727	5,821	28.6
Shoreham	—	272	272	—	—
Southampton (Eastleigh)	235	1,396	1,631	1,338	4.8
Southampton Water	61	64	125	1,299	24.7
Weston-super-Mare	11	71	82	6	—
Wick	252	7	259	583	0.3
Other Aerodromes	644	211	855	7,888	17.5
All reporting Airfields January 1950	9,961	15,286	25,247	103,292	1,743.0
All reporting Airfields January 1949	8,920	14,254	23,174	80,609	1,262.7

ITALIAN REORGANIZATION

THE Italian company, Lati, is now in process of being taken over by Alitalia. Since July, 1949, it has operated a service from Rome to Caracas, using Savoia-Marchetti S.M. 95s. These aircraft will now be added to the Alitalia fleet, making a total of nine S.M. 95s and four Avro Lancastrians. Three DC-4s will shortly replace Lancastrians on Alitalia's South American schedules, and will also operate the former Lati route to Venezeula. Five Fiat G.12Ls, which until recently were in service with Alitalia, have now been sold to the Italian Air Ministry.

THE BRETAGNE TRIALS

UNDER the terms of a contract approved by the French Secretary-General of Civil Aviation, a twin-engined SO.30 Bretagne has been rented to the "Aero-Cargo" company, which will carry out endurance and utilization trials with freight under normal operating conditions. In the course of these trials the aircraft, which is the eleventh on the SO.30 production line, will bring cargoes of fruit to Britain from France or North Africa. Two more aircraft will be leased to other companies to carry out similar tests in the near future. When the aircraft has achieved a sufficient number of flying hours a C. of A. will be granted for the carriage of passengers.

Meanwhile, in the factory at Courbevoie, work is proceeding with the installation of two Hispano-Nene turbojets in an SO.30. It is expected that this version will fly during the summer.

THIRD-PARTY LIABILITY

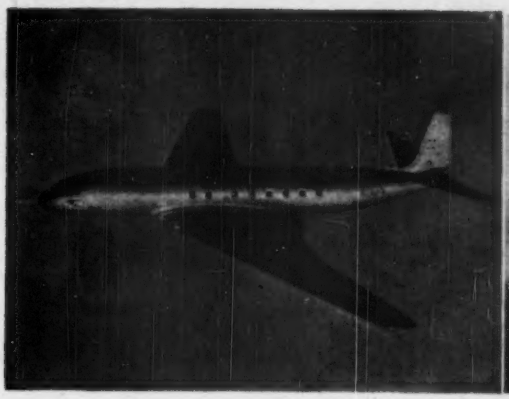
AT the fifth session of the I.C.A.O. Legal Committee, which met in Sicily in January, the important subject of damage caused by aircraft to third parties on the surface was discussed. A draft convention was prepared, which it is hoped will ultimately replace existing legislation—the Rome Convention of 1933. The text of the draft has been placed on the agenda of the Fourth I.C.A.O. Assembly, which is to be held at Montreal on May 30th.

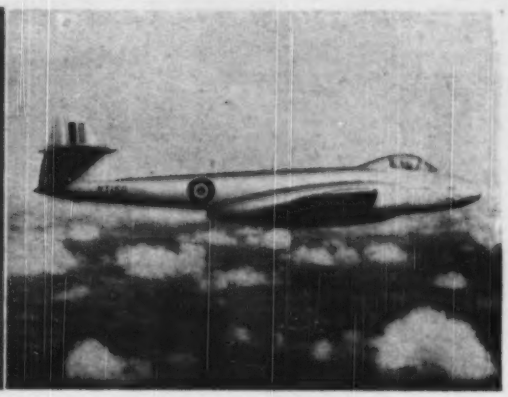
The new text has many differences, notable among which is a new definition of the term "in flight"; this has previously caused considerable difficulty in interpretation and has now been replaced by more satisfactory terminology. In addition the new draft emphasizes that the convention applies not only to damage caused through contact, but also to that brought about by fire or explosion, or by any person or object falling from an aircraft. The principle of absolute liability for such damage is maintained.

The definition of the term "operator" has also been substantially changed. The clause in the Rome Convention "that only a person who uses an aircraft for his own account shall be termed 'operator'" has been maintained, with the added condition that an "operator" shall "either personally or through his servants be in lawful possession of the aircraft and navigate it." This is intended to indicate that the operator must have control of the navigation of the aircraft.

The maximum amount of compensation under the Rome

TO COPENHAGEN *in a hurry!*





COMET *and* METEOR

On 21st March 1950, Group Captain John Cunningham flew the De Havilland Comet from London to Copenhagen and back. The average speed of 437 m.p.h. for the double journey is the fastest ever by an air liner.

On 4th April 1950, Squadron Leader Janusz Zurakowski flew a Rolls-Royce engined Gloster Meteor 8 from London to Copenhagen and back. The average speed of 520½ m.p.h. for the double journey is the fastest ever by a single seat fighter.

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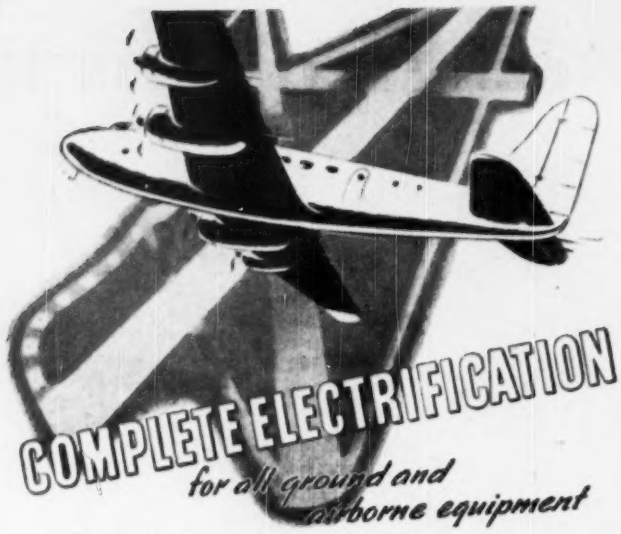
THE MASTERPIECE IN OILS



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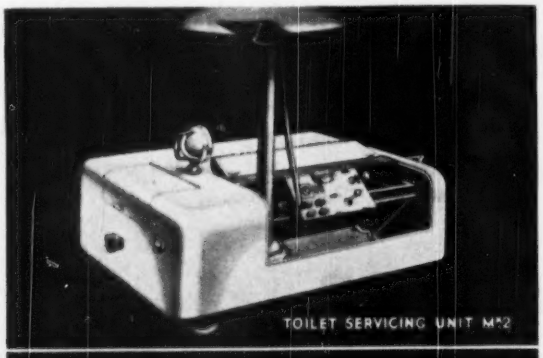
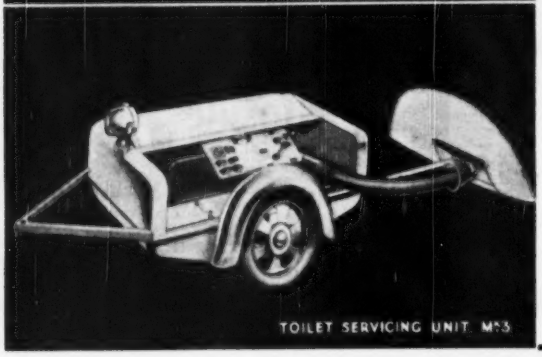


TOILET SERVICING UNIT Mk2



TOILET SERVICING UNIT Mk3

AIRCRAFT DIVISION

Aircraft Equipment

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SELF CONTAINED
Draining, Sluicing and Charging

CAPACITIES
Toilet Servicing Unit MK 2 — 10 Toilets
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CIVIL AVIATION NEWS . . .

Convention is 2 million Poincaré gold francs, and is proportional to the weight of the aircraft at the rate of 250 francs per kilo. The maximum amount for loss of life is 200,000 francs. Under the new draft, the amount of compensation without any proof of fault has been raised to 6 million francs, the rate of increase being 100 francs per kilo of aircraft weight. Special rules have been laid down concerning gliders, balloons and smaller aircraft. New principles of distributing the compensation have been provided, and the compulsory insurance requirements of the former convention have been eased in the new draft.

A system whereby a court of law in the country in which an accident occurs has exclusive jurisdiction over all subsequent actions is recommended. In a report and commentary on the new draft convention I.C.A.O.'s Legal Committee considers that the present text represents a solution which takes into account both the interests of third parties on the surface and the operator, and therefore should be considered as generally satisfactory and acceptable.

NEW COLONIAL LINK

PLANS for the establishment of an air link between British Guiana and Boa Vista in Brazil will be finalised during a visit to the colony this month by the Brazilian Governor of the Federal Territory of the Rio Branco. British Guiana Airways have been granted permission to carry aviation spirit, flour, sugar, rice and cement to Boa Vista from Port Georgetown. With the exception of rice and sugar, for which quantities of 500 tons annually are authorized, the supplies needed in Boa Vista will not be taken from the local stocks but from imports entering British Guiana as transit cargo.

The extensive increases in freight traffic which will result from this bilateral agreement will serve to improve the company's annual revenue and consequently reduce the Government subsidy which is now required to meet the increasing operational losses that are being incurred.

The existence of a U.K.-Brazil agreement has removed any currency exchange difficulties which might otherwise have been involved, and the new service should equalize payloads on British Guiana Airways' aircraft in both directions. A photograph of a B.G.A. Dakota appeared in *Flight* last week.

BREVITIES

A BILATERAL agreement has been concluded between the British and Swiss Governments by which Swiss airlines will operate to and through the U.K., and British aircraft will operate into Switzerland. The agreement was signed by Lord Pakenham and the Swiss Minister in London on April 5th.

* * *

It is understood that an application by Scottish Aviation to operate the Aberdeen-Belfast service, which was refused by the M.C.A. last year, has again been recommended by the Air Transport Advisory Council. The company plans to run a daily service between Aberdeen and Belfast *via* Perth, Edinburgh and Prestwick.

* * *

When the Vickers Viscount arrived at Northolt after completing the first part of its Continental demonstration tour, Sir Hew Kilner, managing director of Vickers, said "... everyone who flew in the airliner liked it very much indeed ... we gave 42 demonstration flights for foreign airline officials, and I think there is a very good possibility of selling the Viscount to two or three of the countries we visited."

* * *

Panagra inaugurated a service from Miami to La Paz with Jato-equipped DC-4s on March 30th. The new service, which replaces twin-engined aircraft on a twice-weekly schedule between Lima and La Paz, will connect with flights along the west coast of South America; it will also reduce elapsed time between Miami and La Paz by two hours. The Jato equipment will provide the extra power which may be required for take-offs at the high altitude at which La Paz is located.

STRANGE CARGO: Airwork Ltd. was recently asked to perform an unusual charter flight which involved the transport of two rare white Rhinoceroses from Khartoum to Antwerp. The animals—which were accompanied by other *fauna* for Antwerp Zoo—are shown being unloaded at the airport.

I.C.A.O. has announced that Dr. Albert Roper is to retire next year from his post of Secretary-General. He was formerly Secretary-General to I.C.A.N. in Paris from 1922-47. Dr. Roper, who was born in France, served as a pilot with the French Air Force during the first World War.

* * *

In Information Circular No. 31, M.C.A. announces changes in certain fees chargeable under Schedule IV of the Air Navigation Order, 1949. The changes affect certification of aircraft and equipment, permits to fly and also medical examinations for the renewal of crew licences.

* * *

B.O.A.C.'s Yorks used on the Nassau-Miami route were replaced on April 1st by Vikings operated under charter by B.W.I.A., the Corporation's associate company in the Caribbean area. The Vikings will make two return flights a day throughout the year, but during the peak tourist season the frequency will be increased to three round trips a day.

* * *

At a meeting of the Leith Dock Commission last week it was reported that M.C.A. officials who had inspected the proposed site for the construction of a flying-boat base at Leith Docks were satisfied with the arrangements; the grant of a licence is expected in the near future. As mentioned in *Flight* of March 2nd, Aquila Airways propose to use the base on a scheduled service between Leith and Falmouth.

* * *

Representatives of thirty-two nations and seven international organizations are attending an I.C.A.O. Regional Air Navigation meeting which opened in Havana, Cuba, on April 11th. The session was called to examine the needs of civil aviation in the Caribbean area. Among matters on the agenda are airport facilities, navigational aids, air traffic control and rescue services. The meeting is expected to last for about three weeks.

* * *

Ringway Airport, owned by the Manchester Corporation, will be taken over by the State on July 1st. The M.C.A. has stated that compensation will be payable from that date. It is understood that a deputation from the Manchester Airport Committee will shortly ask the Minister to permit the Corporation to retain control and act as agent for the Government. The services at present using the airport will be unaffected by the change.

* * *

With effect from April 16th, K.L.M. introduced a new summer schedule which includes several frequency increases on European services. A three-times-weekly flight is being made between Glasgow and Amsterdam, and the London-Amsterdam service is now flown daily. The Amsterdam-Manchester-Dublin service is increased from four to six flights weekly, and the frequency of the Oslo flights from four to seven. In addition, the weekly services to New York are increased to eight, and westbound flying time on the Indonesian route has been reduced by 45 hr by abolishing overnight stops.

FROM the CLUBS

The Boston Aero Club is officially opened by the Mayor. Some of the thirty-odd aircraft which took part in the rally are shown above.

"Flight" photographs.

BOSTON BEGINS

ON Good Friday, the Boston Aero Club held a very successful rally to mark its official opening. More than 30 aircraft carrying private owners and club pilots arrived, and this must be regarded as a good attendance so early in the season—particularly so in view of rather discouraging weather reports. Austers and Messengers predominated, but the gathering also included several Proctors, Geminis and even Rapides. The large number of Austers which battled gamely against high winds to reach Boston was in itself a particularly good show. The guests were entertained at a cocktail party in the new clubhouse and to a luncheon in a nearby marquee.

The official opening ceremony was performed in the afternoon by the Mayor of Boston, who then encouraged members of the general public to partake of the joys of flying by doing so himself, accompanied by the Mayoress, in a Messenger piloted by Mr. G. N. Snarey, A.F.C., Boston's hon. secretary and C.F.I. The programme included a height and speed judging competition and a model aircraft display by the Boston Aeromodellers. At the end of the afternoon there was an unfortunate accident, to which reference was made in a note last week.

After a very enjoyable day, visiting pilots began to depart at about four o'clock. Having been so well entertained in Boston, there is no doubt that many of them will, in the near future, drop in again for informal calls at this pleasant spot on the western outskirts of the well-known Lincolnshire town.

REVIEWING the first year of the Cheltenham Aero Club's operations, many of the difficulties which it has experienced at Staverton airfield are commented upon in a recent news-letter. The premises which the club was permitted by the Air Ministry to occupy have proved quite inadequate for the advanced type of training which was planned, and thus only a modest beginning could be made. It was hoped originally to offer facilities for Link Trainer, S.B.A., and familiarization on various types.

During the year a number of *ab initio* pupils went solo, and a certain amount of advanced instruction was given. In the face of great difficulties, night flying was also started. A regular course of lectures is now in progress, and membership has increased considerably. With the co-operation of Auster Aircraft, Ltd., a crop-spraying and crop-dusting demonstration is being arranged at Staverton for the benefit of local farmers; the date is to be announced later. Farmers and fruit-growers wishing to attend will be made honorary members for the day, and should apply to the club secretary as early as possible.

* * *

THE Wycombe Flying Club has, by arrangement with Mr. D. Bianchi of Personal Plane Services, secured the use of a further Magister for instructional purposes. This aircraft will be flown by one of the club's members, Mr. H. E. Scrope, in the King's Cup Race this year. The club is concentrating at the moment on the "fly yourself" hire programme, under which the Auster is available for £2 10s per day, plus 10s for every hour flown, excluding the cost of fuel.

Due to high winds at the Easter week-end, only 30 minutes' flying was achieved in four days, but members are now looking forward to a long period of intense activity. The club is located at Blackbushe Airport, and members are permitted to make full use of the airport lounge and restaurant. All intending applicants for membership should contact Mr. David S. Ogilvy, at 9, Imperial Road, Windsor, Berks.

GLIDING NEWS

THE Easter Monday broadcast of a two-seater flight from Dunstable was unfortunately marred not only by the weather, but by the poor quality of the transmission. Although the description of the take-off and the flight was excellent, the average listener could have been little attracted to gliding as a sport by the description of the undoubted discomfort under which the flight was made. It appears that the London club has not yet replaced the windshields on its T-21B, and it was unfortunate that such an opportunity for favourable publicity for the gliding movement should have been lost.

* * *

The broadcast followed closely on the announcement that ten gliders had been given to the Free German Youth by the Government of East Germany (contrary to agreement between the occupying Powers). It seems somewhat anomalous that although the Germans have been banned from aviation as a result of the war, they are given equipment to encourage the gliding movement. In England the only form of encouragement, apart from the A.T.C., is from the Kelmsley Trust, which has done much to help the clubs get started since the war.

* * *

Many clubs are established throughout the country, but it is doubtful whether in the best summer's week-end the number of people actively gliding in England runs into four figures. Several clubs are running attractive summer courses which will undoubtedly bring forth some new members, but the fact remains that newcomers are not flocking to gliding in a way which would delight the hearts of club treasurers. Although gliding has been given adequate publicity and most people must be aware that facilities are available in the United Kingdom, there are probably two main reasons why club membership is so disappointingly small. It perhaps never occurs to the average man watching gliding in progress that he could learn to fly at relatively small cost. The answer would appear to be more use of club two-seaters for properly organized pleasure flights which would not only prove a useful source of income to the clubs, but would undoubtedly attract many of the general public. The second problem is, of course, financial. Most club-sites are far from town and involve expensive fares and long journeys. It is suggested, however, that this problem could be overcome by some arrangement with local bus companies. Additionally, although prospective members are usually aware of the membership fees, they are unable to assess the cost of their subsequent flying, and guidance on that point may often help the waverer. Also, many find it difficult to pay £6 or so in one sum, whereas they might be able to afford 10s per month.

The point appears to be that unless they wish to be left with a hard core of "dyed-in-the-wool" enthusiasts and little money in the bank, gliding clubs must endeavour to attract custom by making it easy to join, easy to visit and easy on

the pocket. Until that is done, gliding will be confined to the select few, and can never gain the popular appeal necessary to support more advanced soaring and competitions.

* * *

One of the drawbacks of the A.T.C. scheme has been that on joining the R.A.F. the cadet's gliding days are virtually over unless he is lucky enough to be posted to one of the stations at which gliding is officially organized. The newly-formed R.A.F. Soaring and Gliding Association hopes to overcome this problem. It is already operating at Detling, and is planning to start clubs at Mildenhall, St. Athan, Boscombe Down and Warton. It is hoped that eventually any member of the R.A.F. who wishes to do so, will be able to glide at or near his home station. The Association itself will also provide more advanced facilities. F/L. R. C. Forbes (Gold "C") will fly the Association's Weihe for the B.G.A. team in the forthcoming International Contests.

The first pilots to achieve the feat of gliding across the Channel since 1939 are Mr. Lorne Welch (chief flying instructor of the Surrey Gliding Club) and F/L. Miller of the R.A.F. Gliding Club at Detling, who, on April 12th, flew to Brussels and Coxyde (Ostend) respectively. Mr. Welch, in a Weihe sailplane, was towed to 1,500ft at Redhill and flew the 203 miles to Brussels in 6¼ hr. F/L. Miller left Detling in the morning and reached Coxyde at about 5 o'clock. The only previous cross-Channel flight was made by Mr. G. H. Stephenson, who flew from Dunstable to Boulogne (125 miles) in 1939.

Mr. Lorne Welch.

CORRESPONDENCE

The Editor of "Flight" does not hold himself responsible for the views expressed by correspondents in these columns. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

Jet-Airliner Markets

AS a regular reader of *Flight* and a great believer in future British aircraft, I have been very interested to hear of the recent flights of the prototype Viscount and Comet to various places abroad with a view to interesting other than British markets.

Now, South African Airways are looking for a modern, fast, 36-40-seater machine to replace their Vikings and Lodestars. They are not likely to buy in America because of the present shortage of dollars. The Viscount is, in every respect, the aircraft to meet their requirements and I feel certain that a demonstration flight to this country (Africa) could not fail to obtain a very substantial order and establish British aircraft here once and for all. Can you not use your influence to bring pressure to bear in the right quarter to arrange such a flight? I am quite sure the Vickers Company would not regret the effort. MEYRICK JAMES.

Elgin, Cape Province.

[We think our correspondent may rest assured that such possibilities as he suggests are already under consideration by the manufacturers and others concerned.—ED.]

Airmail Rates

THE subject of airmail postage is seldom mentioned in your columns but I do feel that it should be accorded more attention. Prior to the second world war, when the "all-up" Empire airmail scheme was in operation, the postage-rate was 1½d per half ounce. Since that time there has been a tremendous increase in aerial transport and yet the charge is 1s per half-ounce. This is not the fault of the airlines, of course, but yet another example of the unwillingness of the Government to accept a reduction in revenue. P. W. CROSSLEY.

Dar-es-Salaam, Tanganyika.

Which Way Up?

MAY I make a few observations in the controversy on the horizon-to-aircraft relation arising from the brilliant photographs of the Meteor 8? As an unwilling but experienced traveller on British Railways (Southern Region), I do not consider that, in the course of a journey, the carriage is swaying but stationary, and that the landscape to port is turning clockwise, whilst the scenery to starboard is moving anti-clockwise. As a willing but inexperienced air traveller I was once under the impression that the aircraft was fairly steady, horizontal and motionless, while the ground, not so very far below, was moving very slowly aft, and occasionally swooped up at a hideous angle to the accompaniment of unpleasant sensations from my inside (though the latter is somewhat irrelevant to the case in point).

As a still more willing, but less inexperienced glider-pilot/instructor, I found that, with practice, it was the aircraft which was upside-down at the highest point of a loop, and not the earth. I also discovered that, in time, it became more easy to recognize that the Tiger Moth was diving and rotating during a spin—not that the machine was flying straight and level towards the hub of a vertical and spinning disc of toy-town trees, roads, fields and houses.

I regard it as mere quibbling to suppose that the photographer decided that the floor of the universe was parallel with the chord of the segment of the globe within his vision.

Bearing in mind some of the "pro" correspondence, as well as the fact that *Flight* is of the most use to those who fly the most, I am inclined to conclude from these first principles that the photographer was correct in his decision to show the ground as a pilot might see it. I wonder if the professional pilot sees this in a similar way. MICHAEL ERDMAN.

London, N.W.3.

Maintenance and Safety

THE interesting and informative article by "A Service Engineer" which appeared under the above title in your issue of March 30th contained two statements which might mislead the layman. It was stated that "an operator wishing to dispense with the necessity of using licensed engineers is given the alternative of working an approved inspection organization." In actual fact, although the overhaul and servicing operations may be performed by unlicensed personnel, the final certification of fitness for flight must be carried out by a licensed engineer. Further on, the article states: "the approving authority must be satisfied that the number and qualifications of the inspectors under the control of the chief inspector are adequate." The usual practice appears to be that the chief inspector has to be approved, but thereafter he alone is responsible for appointing his staff.

I agree with the author's remark that it is advisable from the standpoint of efficiency to have as many licensed engineers as possible on the inspection staff, but the way is open for the operator, on the apparent grounds of economy, to employ the minimum number essential for the purpose of certification for flight.

The figures quoted in the article, relating to maintenance costs, probably came as a shock to many of your readers, and many operators facing the problem of reducing costs naturally think in terms of reducing maintenance staffs and so risking an increase in the turn-round time and putting the costs up to a greater extent.

The solution to the problem of economical maintenance rests with the designer of the aircraft. An aircraft is an asset only when it is flying and earning money; on the ground it is a liability. High speed and payload are important considerations, but the revenue obtained can be considerably reduced by long periods spent on the ground in carrying out adjustments and replacements where the components are inaccessible.

These points are quite obvious, yet the fact remains that high maintenance costs indicate that design staffs have not given sufficient consideration to the problems of the maintenance engineer. One of the first steps in the interests of both economy and safety should be to call a halt to the present craze for unnecessary complication and duplication and to return to simplicity in design as far as possible.

There appears to be a reluctance on the part of some design staffs to seek the advice of the maintenance engineer, and where advice is sought any proposals can be vetoed if they do not happen to suit the fancy of the designer. If we are really to get down to the problem, such proposals should be given the same serious consideration as those from the production staff who are going to make the aircraft. In other words, it should be a team job, perhaps under the chairmanship—but not dictatorship—of the designer. These remarks should not

CORRESPONDENCE . . .

be interpreted to mean that maintenance engineers are "again" designers, nor that all designers are considered to lack practical experience. The engineers appreciate that the designer is the responsible individual and that he has many complex problems to face. It is also a known fact that some firms expect their design staffs to have some practical experience. This may vary from a few months in the assembly shop, tightening-up nuts, to a complete works apprenticeship, all of which helps the designer from the angle of construction, but still leaves the maintenance aspect largely untouched. It is not reasonable to expect a designer to spend the many years necessary to obtain adequate experience in the specialized job of aircraft maintenance in order to understand thoroughly all the problems involved, and this where the licensed engineers feel that they can help.

The Society of Licensed Aircraft Engineers has a Civil Aircraft Specifications Panel, and is also instituting a Companion Membership to include technical grades in design and production. It is hoped that many technicians, especially up-and-coming designers, will take this opportunity of meeting the maintenance engineers, and by an exchange of information and opinions make a contribution to the solution of the problem of economical maintenance.

Hamble, Hants. N. LUKE, A.R.Ae.S., M.S.L.A.E.

High-altitude Interception

I HAVE not had the pleasure of meeting W/C. E. Coton, the author of "Has the Interceptor Had its Day?" (*Flight*, April 6th), but I am in complete agreement with the views expressed in his article.

Having spent twelve months on a Meteor Squadron and six months with a Vampire Squadron I appreciate this new factor which he so admirably describes as "handling ceiling." The modern fighter or interceptor is simply a gun-platform, and unless it can be held steady when the guns are to be fired it is useless. It is frequently impossible these days to hold an interceptor fighter steady at high altitudes and high Mach numbers.

The guided missile must soon take the place of the interceptor fighter. F/L. J. CRAMPTON, D.F.C.

London, S.W.1.

Sensible Saucer?

A STATEMENT in the London Press of April 4th, asserting that an American journal claims flying saucers "built in U.S." prompts me to submit brief details of my belief that this method of flight is not only possible, but may have a highly economical and efficient application.

If two saucer-shaped discs (I use the adjective for want of a better one) are placed one on top of the other, the top one being inverted so as to form a cavity between the two, you have the broad outline of the structure. These discs would be contra-rotating, by means of jet-reaction from tangential orifices, and their design would embody a hub braced to the periphery by a series of high-aspect-ratio aerofoil blades. The lift/weight ratio should be high, since such a large proportion of the structure would be a lifting surface. An undercarriage of three wheels placed equidistantly round the rim of the lower disc would enable rotation to be started on the ground until sufficient lift was created for take-off. So much for vertical propulsion.

Horizontal motion and directional control could be achieved by mounting a gyro-stabilized platform in the cavity between the two hubs (containing Perspex visors) from which the pilot could control the angle of incidence of the jet-pipe orifices to put the disc plane on a cant, the incidence angle of the orifices being controlled independently around the cyclic plane as the rotors on a helicopter.

St. Agnes, Cornwall. R. H. H. SLADE.

A Story of "617"

I AM undertaking a fairly comprehensive book on 617 Squadron (the famous "Dam Busters"), and the Vice-Chief of the Air Staff, Air Chief Marshal the Hon. Sir Ralph Cochrane, who is keen on the project, has suggested that I write to you in the hope that some of your readers may be able to supply some of the information I need.

I want it to be not so much a prosaic history as a book that gets the spirit of the squadron and of the R.A.F., and for that I need anecdotes, diaries, personal sketches and all that sort of thing.

There must be many of your readers who served with 617 or knew its people well, and I would be tremendously grateful if you could publish this and if people who might be able to help would contact me (45a, Boscobel Place, London, S.W.1—Sloane 3188).

No scrap of information will be too small to be appreciated. I want to talk to the aircrew and the erks, drivers, cooks, mess stewards, intelligence types, clerks—just about as many as I can. Any diaries or sketches lent to me will be most carefully guarded and returned.

The human side of a squadron tends to be lost after a few years. I think it would be a great pity if the story of 617 could not be told. PAUL BRICKHILL

London, S.W.1. (Ex-F/L., R.A.A.F.)

Wanted—Imperishable Yarns

JOHN BRANCKER of B.O.A.C. has suggested to me that I might try to collect into a book some of the funny—but printable—stories of the early days of Imperial Airways. In the course of my travels I have collected many already, and hope to collect many more before those who could tell them lose touch. At the recent reunion of "aborigines" of Croydon airport, we heard a few which are too good to lose. Will old Imperial Airways types who have not yet gone further gaga than they ever were, send me (at 30, Redburn Street, London, S.W.3) as many of the good old stories as they can remember? GEOFFREY DORMAN.

London, S.W.3.

FORTHCOMING EVENTS

April 21. Institute of Navigation: "Dynamics of Space Flight," by A. C. Clarke; "Interplanetary Navigation," by Dr. R. d'E. Atkinson.
April 22. Helicopter Association: Annual General Meeting.
April 25. R.Ae.S. Section Lecture: "Flight Refuelling and the Problem of Range," by C. H. Latimer Needham, M.Sc., F.R.Ae.S.
April 25. R.Ae.C.: Film Show, Londonderry House.
April 26. R.Ae.S. (Preston): Annual General Meeting.
April 27. R.Ae.S.: "High-speed Research in the Aerodynamics Division of the N.P.L." by J. A. Beavan, M.A. (Cantab.), A.F.R.Ae.S., and D. W. Holder, D.I.C., A.C.G.I., B.Sc. (at Manchester).
May 4. R.Ae.S.: Third Louis Blériot Lecture, by Sir Frederick Handley Page, C.B.E., F.I.Ae.S., Hon. F.R.Ae.S. (in Paris).
May 14. R.Ae.S. Garden Party, White Waltham.
May 16. Aero Golfing Society: Flight Cup Meeting, St. George's Hill.
May 19. Bomber Command Night, Royal Albert Hall.
May 19-21. Air Tour of Sicily.
May 20. Northamptonshire Aero Club: At Home.
May 20-21. Yorkshire Aeroplane Club: International Rally, Sherburn-in-Elmet.
May 25. R.Ae.S.: 38th Wilbur Wright Memorial Lecture, by Sir Richard Fairey, M.B.E.
May 27-29. Champagny Rally, Epernay-Plivot.
May 27-28. Bembridge and Sandown Aero Club: Rally.
May 28-29. Ailes d'Azur Rally, Cannes.
May 29. West London Aero Club: S.S.A.F.A. Display, White Waltham.
June 2-4. Tyrol Rally, Innsbruck.
June 3. Derby Aero Club: "At Home" and Display.
June 3-4. "Wines of Anjou" Rally, Angers.
June 3-4. Ultra Light Aircraft Association: Rally, Fairwood Common.
June 4. F.A.I.: General Conference, Stockholm.
June 4. Aero Club of Normandy: Aerobatic Competition.
June 4. Ragosine Trophy Navigation Competition, Rearsby.
June 10. Blackpool and Fylde Aero Club: At Home.
June 10. Darlington Flying Display.
June 10. Yorkshire Aeroplane Club: International Rally, Sherburn-in-Elmet, Leeds.
June 10-25. Brussels International Aeronautical Exhibition.
June 11. Fête Aérienne d'Orly, Paris.
June 15-18. Benelux Air Tour.
June 16. Institute of Navigation: "A Survey Flight to South Africa," by J. L. Cowan; "Light-aircraft Navigation," by Michael Townsend.
June 16-19. Aero Club de Roussillon: Perpignan Rally.
June 17-18. Normandy Rally.
June 17. Wolverhampton Aero Club: King's Cup Race.
June 18. Wolverhampton Aero Club: Goodyear Trophy Race.
June 23. Institute of Navigation: "Aeronautical Charts," by T. St. Barbe Freer.
June 24-26. Le Touquet Rally.
July 1-3. R.Ae.C.: Members' Deauville Rally.
July 2-9. Aero Club of Italy: International Air Week.
July 3-16. Aero Club of Sweden: International Gliding Contests, Orebro.
July 7-8. Royal Air Force Display, Farnborough.
July 8. Wiltshire Flying Club: At Home.
July 8-10. R.Ae.C.: Members' Ile Baute Rally.
July 10-15. Fourth World Power Conference, London (to include papers on gas turbines, by M. Roy; Dr. D. M. Smith; F. Owner with Dr. S. G. Hooker; W. Karrer; L. N. Rowley with B. G. A. Skrotzki; and J. S. Alford).
July 14-16. Cognac International Rally.
July 16. Redhill Flying Club: "At Home."
July 16. Auster Rally, Rearsby.
July 22. Yorkshire Aeroplane Club: International S.B.A.C. and Air League Cup Races, Sherburn-in-Elmet, Leeds.
July 22-23. Aero Club de Touraine: Tours Rally.
July 22-30. Derbyshire and Lancashire Gliding Club: National Gliding Contests.

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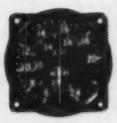

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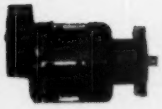

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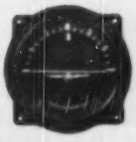

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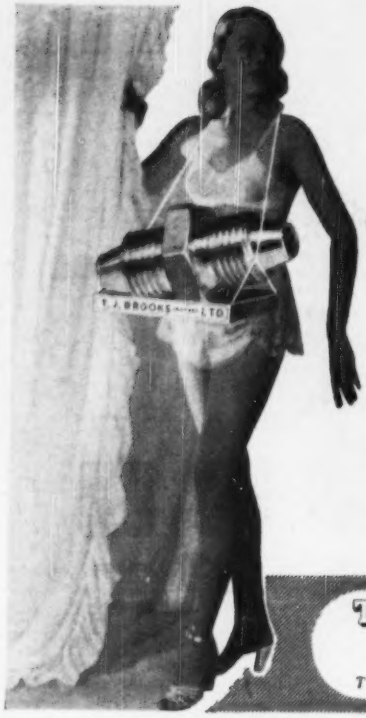

a break for the Backroom Boys

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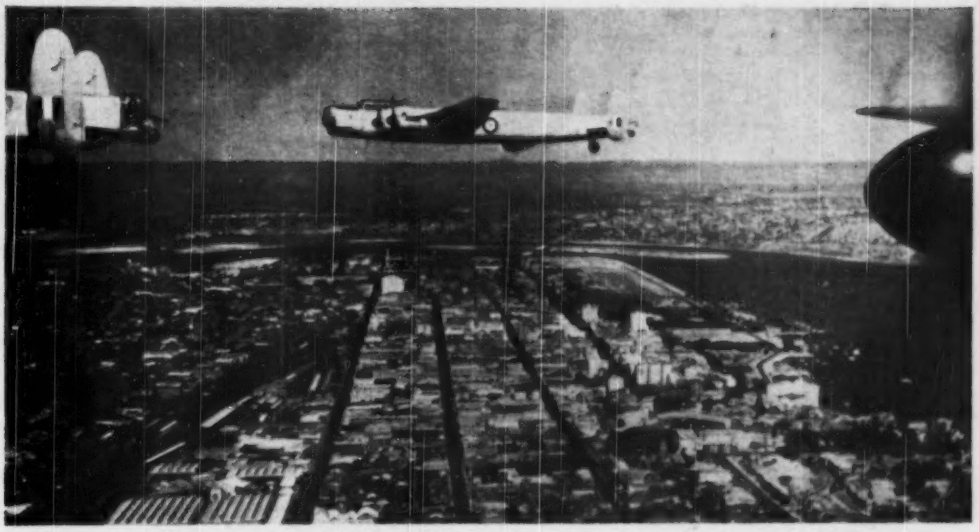

ALL-AUSTRALIAN: Avro Lincolns of the R.A.A.F. in open formation over Perth, the capital of Western Australia. Not only the aircraft (Mk. 30s) but their Rolls-Royce Merlin 102 power-plants are Australian built. A Lincoln of the R.A.A.F. last week took off for a six-month tour of duty in England, during which time it will be demonstrated at the forthcoming R.A.F. Display.

SERVICE AVIATION

International Squadron

THE Brussels Treaty Organization has set up the first completely integrated international defence unit to be formed in peacetime. It takes the form of an Examining Squadron, which will standardize the flying training, and improve the efficiency, of the Western Union Air Forces. The formation of this important new unit is referred to in a leading article on page 481.

Some time ago a number of Continental instructors were attached to the R.A.F. Examining Wing, and sufficient of them are now available to man a self-contained Western Union unit. Its members will visit French, Dutch, Belgian and R.A.F. formations, making identical tests and checks to find a common level of proficiency and lay down a common doctrine in all flying techniques.

Instructors will be expected to do one tour of at least two years with the Examining Squadrons. The Squadron itself will be based for a year in each of the Western Union countries in turn. Its commanding officer will be supplied by the country in which it is based. (During its first year, to be spent in the United Kingdom, S/L. P. M. Dobree-Bell will command the Squadron.)

Much progress, it is stated, has already been made in the co-ordination of training of aircrews, and common rules have been adopted for operational procedures, recognition and routeing of aircraft, to ensure that any Allied aircraft can fly over Allied countries without being engaged by mistake. Harmonized operational procedure has reached the stage where A.A. guns of any one country can work under the control of an A.A. operations room of another.

Royal Air Force and Naval Aviation News and Announcements

Exercise "Activity"

THIS year, as in 1949, the partners of the Western Union will hold combined Naval exercises. The first of these, to be called *Activity*, will take place at the end of May; it will be held under the overall command of a Flag Officer of the Royal Netherlands Navy.

Plans for *Activity* are being formulated by the staff of the Royal Netherlands Navy in co-operation with British and French naval and air force officers. Fewer ships will take part in Exercise *Activity* than in *Verity* last year, but aircraft carriers, cruisers, destroyers, escort vessels, submarines and aircraft (both Naval and R.A.F. Coastal Command) will participate.

Senior Appointments

A SIGNALS specialist, A.V-M. C. P. Brown, C.B., C.B.E., D.F.C., has been appointed Assistant Controller of Supplies (Air) at the Ministry of Supply in succession to A.V-M. R. J. Cuckney, C.B., C.B.E., D.S.C., who has held the post since 1946 and is shortly retiring from the R.A.F.

A.V-M. Brown was until recently Chief Signals Officer at H.Q. Middle East Air Force, Ismalia, and before taking up that appointment in February, 1948, he was at the Air Ministry for five and a half years, first as Director of Radar from August, 1942, and afterwards as Director of Operational Requirements (E) from February, 1946. Previously he was Senior Air Staff Officer of No. 60 Group.

Born in December, 1898, A.V-M. Brown was commissioned in the R.N.A.S. in 1917 and transferred to the R.A.F. on its formation in 1918.

His predecessor, A.V-M. Cuckney, is 53. He served in the R.N.A.S. and was awarded the D.S.C. and Bar before transferring to the R.A.F. in 1918. For several years, he has specialized in maintenance and engineering.

The appointment is also announced, effective from July 1st, of Group Officer N. M. Salmon, O.B.E., as Director of the Women's Royal Air Force. She succeeds Air Commandant Dame Felicity Hanbury, D.B.E., A.D.C., who is retiring from the Force. The new Director was recently appointed W.R.A.F. Staff Officer at B.A.F.O. Headquarters and was previously Deputy Director of the W.R.A.F. at Air Ministry. Born in 1906, G/O. Salmon joined the A.T.S. in 1938 and transferred to the W.A.A.F. on its formation in 1939.

Group Officer N. M. Salmon, O.B.E.

Air Commandant Hanbury, who is 36, joined an R.A.F. company of the A.T.S. in April, 1939. As senior W.A.A.F. Staff Officer at Biggin Hill during the

Battle of Britain, she was awarded the M.B.E. for gallantry in an air attack made on the station.

Royal Tournament Jubilee

THE R.A.F. is to contribute three of the 12 displays constituting this year's jubilee performance of the Royal Tournament. Owing to a greatly increased demand for seats, the Tournament will be held—from June 7th to 24th—at Earls Court instead of Olympia, as in recent years.

A.T.C. Courses at Halton

SINCE May, 1945, F/L. W. D. Porter, of R.A.F. Station Halton, has been in charge of a staff giving seven-day training courses to A.T.C. cadets. In that time about 10,000 cadets have taken the courses, which cover navigation, general service training and airmanship. Up to 90 boys, including members of the Combined Cadet Force, are received each week; they may take any of the four courses and return to Halton for more as often as they like. Facilities provided include flying experience and use of the famed Halton workshops and the station swimming pool.

R.A.F. Social Club in Malta

A SOCIAL club which aims at promoting closer ties between the station's 50 married families has been started at R.A.F. Station Luqa, Malta. G/C. L. F. Brown, the station commander, is the president; in his inaugural speech he outlined an all-the-year-round programme of activity. For the summer months picnics, swimming parties, and visits to places of historic interest will be arranged, and in the winter there will be social afternoons and evenings, sewing meetings, whist drives and lectures by eminent visitors. Activities for the children will also be arranged.

It is hoped eventually to obtain a permanent headquarters, but until these are available the club is using the airmen's rest room for its meetings. The station padre is chairman of the club.

During a recent visit to Malta, Lady Baker, wife of Air Marshal Sir John Baker, Commander-in-Chief, Middle East Air Force, called at the club.

FIGHTING PROFILE: New three-view drawings of Avro Canada's two-seat, all-weather CF-100 fighter (two Rolls-Royce Avons), which is under development for the R.C.A.F. Dimensions are: span, 52ft; length, 52ft 6in; height, 15ft 1in. Performance is still secret.

Services' Motor Cycle Trials

THE Civil Service Motoring Association "Services" Solo Motor Cycle Trials, open to all serving members of the Royal Navy, the Royal Marines, the Army, the Royal Air Force, the Civil Police, and the Civil Service, will be held on Sunday, April 23rd, starting from Bagshot Heath, Surrey, at 11 a.m. All starters in any one Service will ride as a team, and a trophy will be awarded for the best average performance. Individual and special awards will also be made.

Mercy Mission

A 2,000-mile flight of an infantile paralysis patient in a cabinet-type iron lung was completed recently by a Hastings of 47 Squadron, Transport Command, which flew from Fayid to Lyneham, *via* Malta. The patient, the 22-year-old wife of an R.A.F. officer, appeared to suffer no ill-effects from the journey, which was made at low altitude in unfavourable weather.

Several technical difficulties arose concerning the use of the iron lung in the air, but were solved by co-operation between 24 M.U., Chessington, and the R.A.F. Institute of Aviation Medicine. Pilots for the two stages of the journey were, respectively, F/L. C. R. Johnson and F/L. J. G. Brodie, both ex-Coastal and Air Lift pilots.

"Combined Ops." Training

MEMBERS of the R. Aux. A.F. and the R.A.F.V.R. are now looking ahead to the 15 days' annual continuous training which is a feature of the summer season. The 1950 programme promises to offer far more varied instruction than the camps of previous years.

The School of Combined Operations at Fremington, near Barnstaple, North Devon, for example, has hitherto only been able to accept Auxiliary and Reserve officers when there were vacancies on courses for regular officers. Starting in May, however, 15-day courses will be specially arranged for them and officers unable to spare the full time will be able to take a shortened seven-day course.

The syllabus covers such subjects as the technique of combined operations, operational planning and staff work, and lectures on the latest types of assault and landing craft. Instruction will be given by officers of all three Services.

R.A.F. in Russian Zone

IT is probably not generally known, says the Air Ministry, that the R.A.F. is represented in the Russian Occupied Zone of Germany. There is, however, a handful of officers and airmen who are comparatively free to move about there. They are members of the British Commander-in-Chief's Mission to the Soviet Forces of Occupation, or Brixmis, which is its official abbreviated name.

The Mission is composed of officers and men of all three Services, and at present its Chief is Brigadier H. M. Curteis, M.C. It was formed in September, 1946, when Marshal of the R.A.F. Lord Douglas of Kirtleside (then Sir Sholto Douglas) was the British Commander-in-Chief, and Marshal of the Soviet Union Sokolovsky was the Russian C.-in-C.

Reunion

NO. 619 Squadron, Bomber Command. —Fourth annual reunion on April 29th at the Connaught Rooms, Great Queen Street, Kingsway, W.C.2. Tickets (17s 6d) from J. A. Howard, 73, Harborough Road, Kibworth, Leics.

"Flight" photograph.

GOBLIN SHOP: A servicing party at work on D.H. Goblin 2 turbojets in the engine bay at R.A.F. Station Odiham, the base for a wing of Fighter Command Vampires. Most R.A.F. Vampires are powered by the 3,100-lb-thrust Goblin 2, which runs for an overhaul period of 600 hr—the longest of any turbojet in service.

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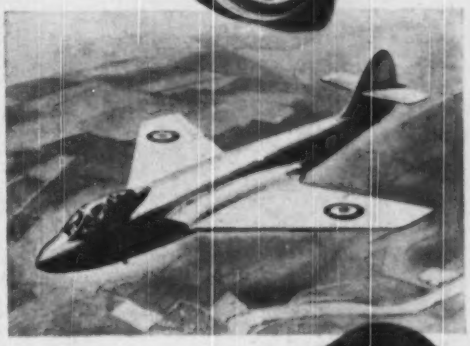

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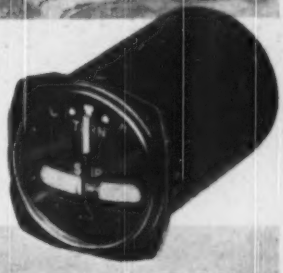

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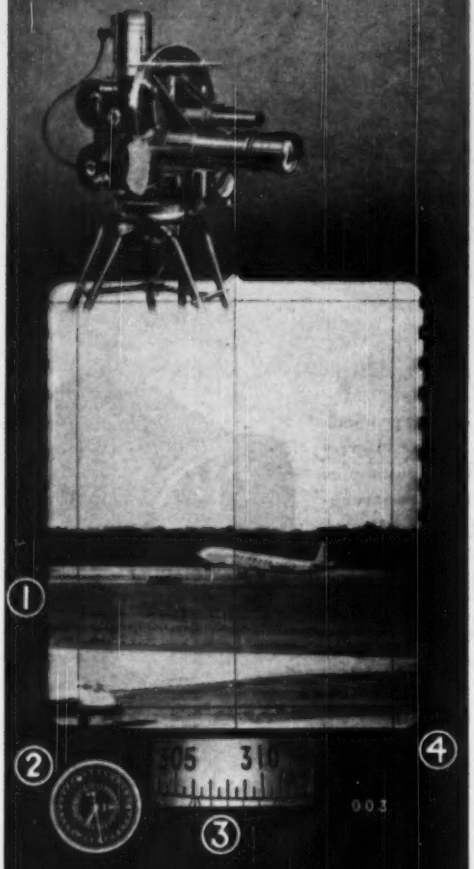

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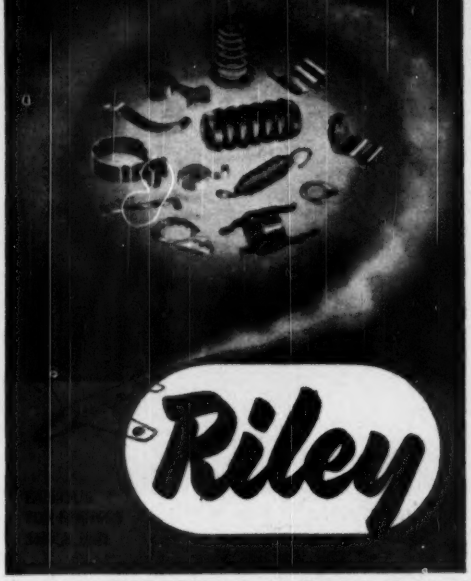

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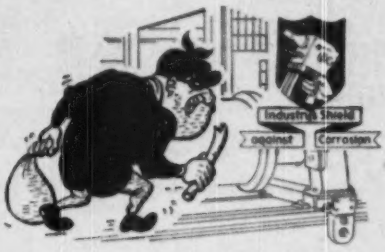

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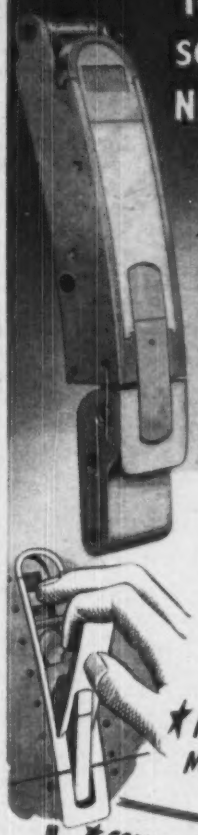

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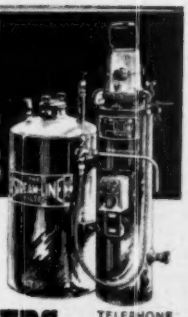

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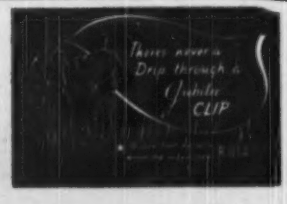

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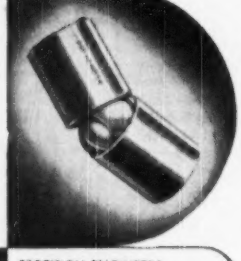

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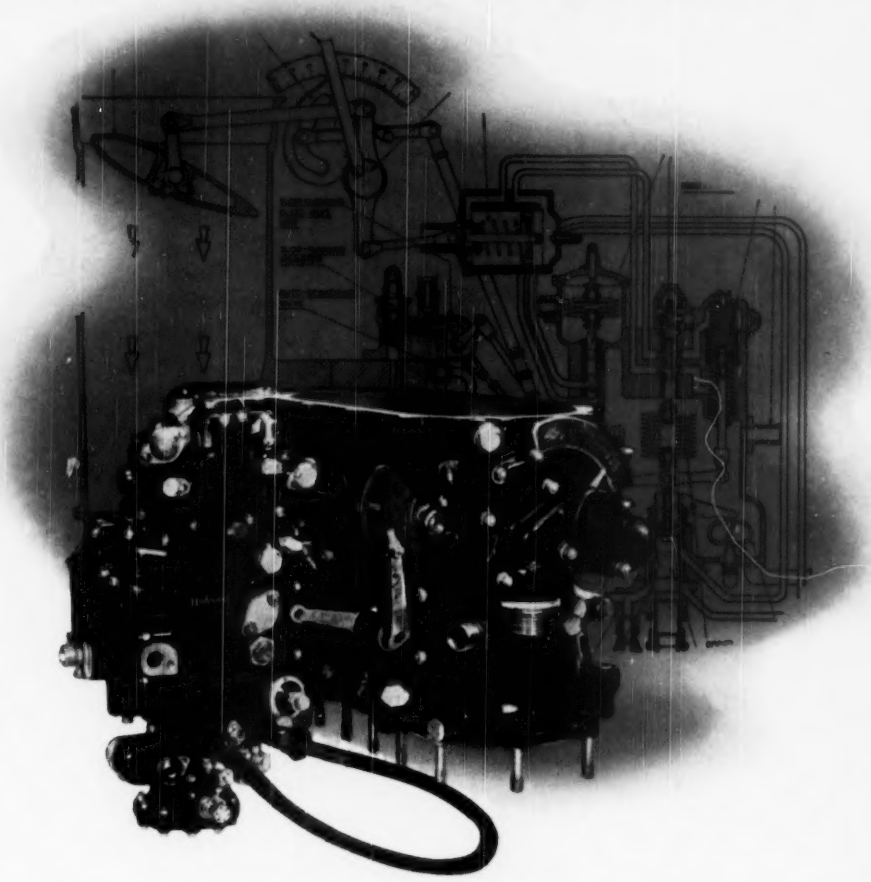

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